PB81-177032

Description of the Regulatory Process for the Chicago, Illinois Case Study
Final Task II Report

Pacific Environmental Services, Inc.
Elmhurst, IL

Prepared for

Council on Environmental Quality
Washington, DC

Aug 79

U.S. Department of Commerce
National Technical Information Service
NTIS

50272-101

REPORT DOCUMENTATION PAGE	1. REPORT NO.	2.	3. PB81-177032

4. Title and Subtitle
Final Task II Report:
Description of the Regulatory Process for the Chicago, Illinois Case Study

5. Report Date
August 1979

6.

7. Author(s)

8. Performing Organization Rept. No.

9. Performing Organization Name and Address

Pacific Environmental Services, Inc.
Midwest Operations Division
465 Fullerton Ave.
Elmhurst, Ill. 60126

10. Project/Task/Work Unit No.

11. Contract(C) or Grant(G) No.
(C) EQ8AC106
(G)

12. Sponsoring Organization Name and Address

Council on Environmental Quality, 722 Jackson Pl. NW, Washington, DC 20006, and U.S. Environmental Protection Agency, 401 M St. SW, Washington, DC 20460

13. Type of Report & Period Covered
final Task II

14.

15. Supplementary Notes

16. Abstract (Limit: 200 words)

CEQ and EPA sponsored five studies examining the response of sources to the regulatory approach to controlling air pollution, with emphasis on the post-compliance emissions history. The study areas are: North Carolina (3 vols), Houston (3 vols), San Diego (3 vols), Chicago (3 vols), and New Jersey (2 vols).

The Task II objective was to measure the control agency effectiveness in fostering compliance by the stationary sources. The study identifies emission problems based on the case histories. Emphasis is on the identification of the time of detection of violations and on the extent to which the identified violations were corrected and further reoccurrence prevented.

17. Document Analysis a. Descriptors

air pollution control
regulation
Chicago
stationary sources

b. Identifiers/Open-Ended Terms

c. COSATI Field/Group

REPRODUCED BY
NATIONAL TECHNICAL
INFORMATION SERVICE
U.S. DEPARTMENT OF COMMERCE
SPRINGFIELD, VA 22161

18. Availability Statement NTIS	19. Security Class (This Report)	21. No. of Pages 179
	20. Security Class (This Page)	22. Price

(See ANSI-Z39.18)

See Instructions on Reverse

OPTIONAL FORM 272 (4-77)
(Formerly NTIS-35)
Department of Commerce

FINAL TASK II REPORT;

DESCRIPTION OF THE REGULATORY PROCESS FOR THE CHICAGO, ILLINOIS CASE STUDY

August 1979

PACIFIC ENVIRONMENTAL SERVICES, INC.
MIDWEST OPERATIONS DIVISION
465 Fullerton Avenue
Elmhurst, Illinois 60126
(312) 530-7272

Prepared for:

U.S. ENVIRONMENTAL PROTECTION AGENCY
Office of Program Evaluation
Washington, D.C. 20460

and

COUNCIL ON ENVIRONMENTAL QUALITY
Washington, D.C. 20006

Pacific Environmental Services, INC.

CORPORATE AND ENGINEERING 1930 14th Street Santa Monica, California 90404 Telephone (213) 450-1800
MIDWEST OPERATIONS 465 Fullerton Avenue Elmhurst, Illinois 60126 Telephone (312) 530-7272

i-a

EXECUTIVE SUMMARY

The primary objective of the Task II report is to discuss the effectiveness of control agency actions in achieving and maintaining industrial source compliance with applicable air pollution control regulations. Discussion further centers on the source view of particular problems and decision making factors associated. Control agencies in the study were the Chicago Department of Environmental Control and the Illinois Environmental Protection Agency.

Project findings on the reason for initial and continuing compliance varied widely with economics being the basic key. Litigation as a factor was less effective. Cost of control considerations were dependent upon such factors as size and type of control measures; plant age; space limitations; nature of the source process; and equipment design, availability, and lead time for construction.

Two factors of economics proved to be common. First, the industry's willingness to use control seemed to be related to the proven nature of the control equipment. Innovative approaches and unproven technology were definitely viewed with suspicion. The second factor, operation and maintenance (O & M), bridges both economic and control agency actions. The control agencies put their emphasis on initial compliance and as a result a significant percentage of the sources surveyed experienced problems with continued compliance. The specific reasons varied, but the nature of the problem seemed to be that, due to the initial compliance emphasis, greater consideration was given to initial capital expenditures for control equipment with inadequate attention given to operating and maintenance once the equipment was in place.

Nontechnical reasons for compliance, included the utilization of a permit system as the most effective tool, the position that voluntary compliance would provide extra flexibility, the feeling that delay would only entail greater expense, threat of enforcement actions, and pressure from inspectors.

One factor in the study which caused problems to industry in dealing with regulatory agencies was the ambiguity of authority between city vs. state. In several instances, the source had negotiated a compliance schedule with one agency only to have the other initiate enforcement actions.

A special report section which includes source description and general comment summaries immediately follows and precedes the main body of the report.

Source No: 1

Type: Steam Generation

Process: 5 90,000 lbs/hr oil fired boilers, natural gas alternate fuel;
1 150,000 lbs/hr oil fired boiler, natural gas alternate fuel;
Underground storage tanks; No. 6 oil; 42,000 gal. fixed roof tank; No. 2 standby fuel oil

Performance:

150,000 lbs boiler operation associated with excessive emissions. All boilers have permits. One malfunction 11/72 caused dense smoke and prompted citizen complaints.

General Comments:

Despite numerous citizen complaints, no enforcement action has been taken against this source. The U.S. EPA inspected this facility 2/76 and found it to be in compliance. Because of local regulation prohibiting fuel with greater than one percent sulfur, no SO_2 problems have occurred. Particulates are also within limits, the problem lying with visible emissions.

Source No: 2

Type: Steam Generation

Process: 4 75 MBTU/hr boilers, interruptable gas or No. 6 oil fired (three boilers produced 200 MBTU/hr maximum load with one boiler on standby), produces 400-325°F psig fed through underground piping to building heat exchangers.

Performance:

Voluntarily installed baghouse is response to citizen complaints in absence of agency demands. All boilers have permits even though not legally required.

General Comments:

Approximately $2,500 in initial capital expenditure resulted from baghouse installation. This, along with higher fuel cost due to an unavailability of natural gas are the only financial impacts, neither a result of agency demands. The state agency did inspect source and subsequently informed them that permits were not needed. Source obviously motivated by factors other than agency pressures.

Source No: 3

Type: Petroleum Products and Handling

Process: Petroleum storage, 32 fixed cone roof tanks containing No. 2/6 fuel oils. Primary processes are loading/storage/unloading. Seven oil fired boilers (four high, three low pressure) presently on line. To be replaced by one high pressure boiler 50,000 lbs/hr, 150 psia, 5 million BTU/hr capacity. Storage tanks bottom loaded.

General Comments:

No control devices are installed on storage tanks or boilerhouse. Local agency suggested control device installation several years ago but no action on either side resulted. Source interactions with EPA have been without incident and mostly of an administrative nature. Since the major product is residual oil, HC emissions are minimal.

Source No: 4

Type: Printing and Publishing

Process: Offset printing on coated paper. Presses employed include six web presses for magazines and 12 sheet fed presses for miscellaneous jobs. 13-15 billion lbs paper printed per year, containing about 700,000 of high solvent concentration inks (about 35 percent). Approximately 65 percent of the ink is consumed by the web presses. Each web press has a dryer, four gas fired, two electrically heated.

General Comments:

Major pollutants are associated with web presses include VOC, vaporized resins, and smoke (visible emissions). Control of two press emissions are by an afterburner, two have no controls and the last two have individual ESPs of 90 percent design efficiency. Financial impacts include approximately 91,000 for filtration system, later removed due to failure. Subsequently purchasing one ESP per year at $46,000 each for three years. Cold weather problems will force $20,000 roof modification to protect ESPs.

Interactions with control agencies has been confrontatory, and source resisted compliance when repeatedly cited for excessive particulate emissions. Source operated without permits. Source has been cited for particulates, VOC, and visible emissions, and control devices were found to be operated intermittantly. Insufficient enforcement, lack of direction and conflicting requirements of control agencies resulted in an ineffective compliance program. Serious steps to reduce emissions are now being taken.

Source No: 5

Type: Secondary Aluminum Smelting

Process: Production of aluminum ingots for die-cast and foundry operations, mainly through recycling of scrap aluminum (approximately 1,000,000 lbs/month). Equipment includes two reverberatory, and one sweat furnace, three melting pots for zinc and a boring dryer. Sweat and reverb furnaces are oil or natural gas fired. Reverb furnace operates 24 hrs/day, 6 days/week. Sweat furnace has maximum process weight of 1,500 lbs/hr. Particulates in the form of metal oxides are the major pollutants from the furnaces. The very effective control system utilized consists of a four module baghouse. A water spray quench cools the air before the baghouse.

General Comments:

Financial impact of the baghouse system has been substantial. Corrected for 1978 dollars, the baghouse system cost $658,000, while a $925,000 initial investment was required for installation of all processing machinery. Control equipment has performed without failure since its start up in 1977. Equipment exceeds control requirements, verified by stack tests.

Performance:

Initially the source refused to consider itself an emitting source, until the IPCB ruled otherwise. Next, they proposed the theory that their emissions were being treated since the building acted like a giant settling chamber. This theory was withdrawn following expert testimony to the contrary. The facility opposed the enforcement approach of the IEPA, prefering the advisory and assistance posture adopted by the Chicago agency.

Source No: 6

Type: Brass and Bronze

Process: Produces brass and bronze ingots by smelting and refining scrap material in three oil fired smelting ovens. Fuel is No. 6 grade fuel oil. Control equipment is by three baghouses.

Performance:

Control equipment is hooded in a fashion so that any furnace can use any baghouse. Exhaust entering baghouse is cooled by spray to 350°F: Some problems have been encountered mainly due to inadequate housekeeping procedures which has resulted in fugitive emissions. The ability of furnaces to switch baghouses prevented excessive emissions for any lengthy period when baghouses were in their initial shakedown operations. At that time there was a problem with baghouse fires.

General Comments:

Source did respond to regulatory action, even though it did take five years to finally have control devices installed. IEPA action later resulted in improved housekeeping and maintenance procedures.

Source No: 7

Type: Chemicals

Process: Production of chemicals, coatings and containers. Process studied for report was proprietary, therefore no mention of process parameters and throughput.

Performance:

Five control devices including aerators, condensors, water and sulfur scrubbers have been installed since 1961 for control of odors and VOC. Present efficiency is approximately 80 percent; insufficient for compliance. No malfunctions have been reported but source feels them to be quite expensive for their performance. Source has petitioned for rule change, which is still in process.

General Comments:

The most significant enforcement activities have occurred over the odor problem, since resolved. Compliance status depends on outcome of petition to change applicable regulations from petrochemical to organic.

Source No: 8

Type: Chemicals

Process: Production of paints by product mixers and solid ball pigments mills. Average production rate is 300,000 lbs/hr and 1250 - 5000lbs/hr solvent useage. Large quantities of particulates are produced. Control is by dry baghouse installed in 1954 and Rotoclone Wet Collector added in 1964 to increase overall control efficiency to 99 percent.

Performance:

A computerized O & M log tracks malfunctions, which are not routinely reported. Facility is well satisfied with this system which also keep precise records of capital as well as O & M costs.

General Comments:

All pollution control equipment was installed prior to 1972. Agency inspections are conducted weekly, primarily due to plant location in a heavily industrialized area. Permits have been issued efficiently, and the source has never been cited for any type of violation.

Source No: 9

Type: Chemicals

Process: Production of inks, prints, coatings, and insecticides. Process studied is proprietary, but involves ammoxidation of xylene in a fluid bed reactor, with HCN, solvent vapors and ammonia present in exhaust air stream. These pollutants are incinerated at 1500°F. Final product packaging methods creates fugitive dust problem, controlled by a small baghouse rated at 99.9 percent efficiency.

Performance:

Capital costs for incinerator was 329,000 in 1972. Annual operating costs are approximately 281,000 (mostly for fuel), with 18,000 annual average maintenance costs. Another $130,000 is alloted for incinerator waste disposal. The baghouse costs $8,800 in 1972. Annual baghouse O & M costs are estimated at $1,000. System on-stream time is estimated at 99 percent. No major continuing problems have occurred. During any incinerator failures, the entire process is terminated.

General Comments:

Facility was granted permits after stack tests. No problems were incurred in obtaining permits. Facility has never been cited for any violations.

Source No: 10

Type: Mineral Process

Process: Facility is a lime transfer station. 1500 ton barges are unloaded by a clamshell bucket and dumped in a receiving hopper, to be transferred to a conveyor belt. Conveyor feeds alternately four 500 ton storage bins. Telescoping spouts from bins fill account trucks. Annual throughput varies from 487,000 to 150,000 tons/yr. Emissions are fugitive particulates, of an irritating and somewhat hazardous nature. Fugitive control is by cessation of operation in rain and winds above 20 mph, covering of loaded trucks, and sweeping of paved lot. Process controls include an enclosed clamshell bucket, induced draft baghouse on receiving hopper, telescoping spouts, and a second baghouse for truck loading.

Performance:

Several equipment related problems have resulted in excess emissions, the first was due to pulley belt failure, and the second due to improper bag installation which resulted in bag rupture. The facility was cited in 1972 for violation of the particulate standard. The facility devised an acceptable compliance schedule and was found to be in compliance in 1973.

General Comments:

Source initiated investigation into control options in 1971, prior to any agency interaction.

Source No: 11

Type: Mineral Process

Process: Facility manufactures building bricks. Major emissions sources are fugitive emissons from storage bins. Process emissions are generated by conveyor transfer of powder-like materials, and the brick molding machines. Control device used is a small unenclosed baghouse.

Performance:

Main process control at the facility is goodhousekeeping measures. No cost breakdowns are available as devices and procedures were in effect prior to 1970. Source inspected in 1973, no violations found.

General Comments:

Source voluntarily reduced emissions prior to control requirements. Has had no difficulty in meeting regulatory administrative requirements.

Source No: 12 (1)

Type: Grain Handling

Process: Facility is a large grain handling and storage operation, with many small sources of emissions. Each conveyor, chutes, silo, etc. is classified as a source. Three grain dryers are additional particulate sources. Thirty-three separate baghouses control emissions.

Performance:

4 to 5 million dollars have been spent since 1962. Baghouses are at the state of the art, and have caused some problem, primarily in maintenance requirements and bag caking. Source entered into compliance agreement prior to original Clean Air Act.

General Comments:

City and state agencies monitored progress carefully.

Source No: 13 (1)

Type: Lumber and Wood Products

Process: Wooden cabinetry manufactures. Process is typical of woodworking industry including sawing, edging, joining, planning, boring, etc. A pneumatic conveyance system transfers wood waste and dust to a roof mounted cyclone. Two boilers are used for space heating. One, oil fired, is only used in extreme cold and the other is fired by woodwaste. Woodwaste boiler is the major source. Control was by precipitator, with new devices being tried.

Performance:

Precipitator proven quite unreliable. Due to pressure from regulatory agencies, source in 1976 initiated major compliance effort. New scrubber system also has had minor problems. Boiler is presently out of compliance and without a permit.

General Comments:

Regulatory agencies have taken discretionary enforcement postures, evidently not considering it a major problem.

Source No: 14

Type: Lumber and Wood Products

Process: Facility manufactures decorative wallboard. Process includes coaters, hoods, dryer and ovens. Only pollutant is hydrocarbons from solvents. Plant uses 200 gals of solvent and 1,200 gals of pigment per day. Control is by switching to exempt solvents.

Performance:

Solvent switching has raised costs significantly, as has new process equipment necessary to apply them. Only enforcement action was brought by U.S. EPA in 1975.

General Comments:

Source concerned over apparent lack of communication from and between regulatory agencies which has resulted in excessive redundant paperwork. Also source was informed of U.S. EPA action against them by announcement on local television newscast.

Source No: 15 (1)

Type: Food Products

Process: Large complex, primarily confectionary product manufacturing. Processes include roasting and other drying operations. All such equipment is gas fired, and exempt from regulations. Despite such exemption, facility has had control equipment since 1950, primarily for product and ingredient recovery. Control equipment began with cyclones and progressed to baghouses to increase recovery efficiency.

Performance:

Control of emissions was an ancillary benefit to product recovery devices installed at company's volition. Few problems have occurred with control equipment. Maintenance is limited to semi-annual bag replacement. While never in violation of emissions limitations, the owner/operator was recalcitrant in fulfilling administrative requirements.

General Comments:

Economic incentives insure proper operation of baghouses.

Source No: 16 (2)

Type: Food Products

Process: Facility is large candy manufacturer, utilizing a four unit boilerhouse for process steam production. There are two standby coal fired units, a gas/No. 6 oil fired units, and a No. 6 oil fired unit. No particulate controls are utilized; all fuels comply with the City one percent sulfur limitations.

Performance:

Source has chosen to comply by shutting down the coal fired units, and replacing them with oil fired units. Steam is purchased from a nearby municipal steam generator (minicipal incinerator).

General Comments:

Source responded only to state agency initiatives. The purchased steam supply is unreliable so the oil and gas fired boilers are retained on 100 percent standby basisand utilized accordingly.

Source No: 17 (1)

Type: Surface Coating

Process: Facility manufactures metal cans and miscellaneous can parts. Fourteen separate coating materials are used. Major processes include can fabricating and sheet coating/lithography. Natural gas fires various processes. Steam is purchased from a nearby facility. Emissions are hydrocarbons from fugitive time sources. One of three lines uses exempt solvents, the other two have hood collectors exhausting to a catalytic afterburner.

Performance:

No serious difficulties except for minor start up debugging were encountered with afterburner. Source has spent in excess of $300,000 for the afterburner. Costs of natural gas has raised annual operating costs above $95,000.

General Comments:

Source only responded to state agency initiatives.

Source No: 18 (2)

Type: Surface Coating

Process: Bicycles and associated components manufacture. Processes types include forming, stamping, welding, electroplating painting and printing. Main subjects were primer and printing. Both lines utilize non-reactive solvents. Particulate emissions from grinding and polishing operations are controlled by ten cyclones and three baghouses. Chronic acid mists from plating are controlled by scrubbers. Three day baffle filters and a waterwall spray booth further control overspray.

Performance:

Expenditure breakdowns were unavailable, but maintenance for control devices is in the range of $15,000 annually. No operational problems were reported. Firm switched to exempt solvents, and then requested a variance from their use for one year due to supply problems. Six month variance was granted and source operated an additional six months out of compliance after variance expired.

General Comments:

Source management made every attempt to cooperate with investigators and agency personnel. Source has had little difficulty in obtaining permits, due to their cooperative attitude.

TABLE OF CONTENTS

Section Page

1.0 INTRODUCTION 1-1

Project Objectives 1-1
Task II Objectives 1-3
Source Selection Methodology 1-4
Source Visit Procedures 1-6
Organization of the Task II Report 1-10

2.0 COMPARISONS AND CONCLUSIONS

Economic Considerations 2-1
Technical Reasons for Compliance 2-6
Non-technical Reasons for Compliance 2-9
Conclusions 2-14

3.0 STATIONARY SOURCE DATA SUMMARIES 3-1

Steam Generators 3-3
  Facility No. 1 3-4
  Facility No. 2 3-9

Petroleum Products and Handling 3-13
  Facility No. 1 3-14

Printing and Publishing 3-23
  Facility No. 1 3-24

Secondary Aluminum 3-32
  Facility No. 1 3-33

Brass and Bronze 3-44
  Facility No. 1 3-45

Chemicals 3-48
  Facility No. 1 3-49
  Facility No. 2 3-54
  Facility No. 3 3-57

Section Page

Mineral Processes 3-61
Facility No. 1 3-62
Facility No. 2 3-67

Grain Handling 3-70
Facility No. 1 3-71

Lumber and Wood Products 3-76
Facility No. 1 3-77
Facility No. 2 3-89

Food Products 3-93
Facility No. 1 3-94
Facility No. 2 3-98

Surface Coating 3-104
Facility No. 1 3-105
Facility No. 2 3-110
Facility No. 3 3-115

APPENDIX A SAMPLE LETTER OF INTRODUCTION A-1

APPENDIX B SAMPLE CHICAGO ASSOCIATION OF COMMERCE AND INDUSTRY LETTER A-3

APPENDIX B SAMPLE FACILITY DATA COLLECTION CHECKLIST A-6

LIST OF ILLUSTRATIONS

Figure Page

1-1 Facility Visit Procedure 1-7
2-1 Economic Considerations Regarding Facility Compliance. . . 2-2
2-2 Control Technology Development By Pollutant - Chicago Case Study 2-8
3-1 Facility Number 1 - Steam Generation 3-7
3-2 Facility Number 1 - Steam Generation 3-8
3-3 Sulfur Dioxide Emissions Profile - Facility Number 2 - Steam Generation 3-11
3-4 Sulfur Dioxide Emissions and Energy Profiles 3-12
3-5 Annual Hydrocarbon Emissions Profile 3-19
3-6 Daily Hydrocarbon Emissions Profile. 3-20
3-7 Annual Boiler Emission Profile 3-21
3-8 Sulfur Emission Profile 3-22
3-9 Emission Profile - Annual 3-39
3-10 Typical Day Emission Profiles 3-31
3-11 TSP Emission Profile 3-42
3-12 Emission Profile 3-47
3-13 Annual Emissions Profile (Organic) 3-53
3-14 Annual Emissions Profile (Particulate) 3-56
3-15 Annual Emissions Profile (Solvent and HCN Emissions) . . . 3-60
3-16 Yearly Emissions Profile (Particulates) 3-66
3-17 TSP Emissions Profiles 3-69
3-18 Emissions Profile (Source: Grain Handling) 3-74
3-19 Typical Day Profile 3-75
3-20 Annual Particulate Emissions Profile 3-86
3-21 Typical Day Emissions Profile 3-87
3-22 Annual Hydrocarbon Emissions 3-92
3-23 Annual TSP Emission Profile 3-97
3-24 Annual Emission Profile 3-102
3-25 Typical Day Emissions Profile 3-103
3-26 Qualitative Profile of Hydrocarbon Emissions 3-109
3-27 Annual Emissions Profile 3-113
3-28 Typical Day Profile 3-114
3-29 Surface Coating Profile. 3-120

LIST OF TABLES

Table Page

1-1 Stationary Source List Distribution 1-5
2-1 Economic Comparisons 2-4
2-2 Stationary Source Control Equipment Types/Costs 2-5
2-3 Facility Initial Compliance History 2-10
2-4 Initial Compliance History Non-Technical Primary Motivators Cited by Industry 2-12
2-5 Operation and Maintenance Programs - Apparent Problem Causes 2-16
2-6 Operation and Maintenance Programs - Principal Actors . . 2-18
2-7 Magnitude of Excess Emissions 2-20
2-8 Potential Relationships Between Source Compliances and Alternative Regulatory Approaches 2-22
3-1 Thru-Put Data 3-16

1.0 INTRODUCTION

1.1 PROJECT OBJECTIVES

In July of 1978, the Council on Environmental Quality (CEQ), in association with the U.S. Environmental Protection Agency (EPA), contracted with Pacific Environmental Services, Inc. (PES) to study the "Effectiveness and Costs of Selected State and Local Regulations for the Reduction of Emissions to the Atmosphere from Stationary Sources" (Contract No. EQ8AC106). Under the contract, PES is to perform two case studies which will involve Chicago, Illinois and San Diego, California. This Task II Report represents the second phase of the study.

As discussed in the Task I Report, the purpose of the overall study is:

- To determine empirically the nature and extent of the response to existing state/local air pollution control agency regulations;
- To explain the reasons for the actual source reponses;
- To determine the relationship of various regulatory actions to pollutant emission reductions over time; and
- To examine the cost-effectiveness of the control agency in terms of bringing about emission reductions.

During the course of this study, particular emphasis is being placed upon the degree to which pollutant emission reductions were achieved and maintained over time. The desired result of this study is to examine (as systematically as practicable) and to determine the actual achievements, in terms of overall program effectiveness and associated costs of the state and local government, in planning the attainment and maintenance of the required pollutant emission reductions by stationary sources through direct regulation.

Each case study has the following three main phases:

- o An analysis of the regulatory process by focusing upon the rules, regulations, procedures, practices, and costs associated with the respective state and/or local control agencies;
- o The performance of various individual stationary sources of air pollution in responding to direct regulation over time; and
- o A determination of the effectiveness of agency activities in terms of cost, the comparison of all case study results to generic source categories, and recommendations by involving and/or replacing the existing regulatory processes.

Draft and final reports associated with Phase I, viz., description of the regulatory process in Chicago and San Diego, have been completed. The report contained within, represents the data and results obtained by PES for the Chicago, Illinois case study regarding Phase II of the study.

Under Task I of the Chicago case study, PES focused upon the regulatory programs of the Illinois Environmental Protection Agency (IEPA), and the City of Chicago Department of Environmental Control (CDEC). PES staff members met with technical/administrative personnel of the IEPA offices in Springfield and Maywood, Illinois, as well as the CDEC and the U.S. Environmental Protection Agency, (U.S. EPA) Region V Office. In addition, PES staff reviewed the files of these agencies concerning various levels of activity with respect to initial and/or continued industrial facility compliance (e.g. budgets, grant applications, inspection, permit processing, litigation records, organization and staffing schedules, agency program plans, and industrial records and files). Through these interviews and record examinations, PES prepared the Task I Report discussing the background and development of control; the growth and organization of the IEPA/CDEC programs within the City of Chicago; the allocation of funds by category of expenditure, and sources of funds; the regulatory processes; the general nature of the facilities regulated; and the mechanisms, policies and procedures for the application of sanctions.

It was determined that both agencies utilize extensive permitting and enforcement functions - the IEPA through its regional office structure; the CDEC through its fleet of mobile inspectors. The IEPA enforcement policies in recent years have tended to favor an approach centered around litigation; while the CDEC approach has tended to concentrate upon agency-industry negotiations.

The above-referenced compliance/enforcement policies and/or strategies of the IEPA and the CDEC have been maintained in conjunction with relatively steady agency increases since 1970.

1.2 TASK II OBJECTIVES

The objective of Task II of the study is to measure the control agency effectiveness in fostering compliance by the stationary sources. In addition, the study is to identify any remaining facility emission problems based upon the industrial case histories prepared under Task II. Further, the study focuses upon the identification of various control agency actions plus the facility responses to such actions which occurred during the "pre-compliance" and "continuing compliance" phases. The emphasis of this task is on the identification of the time of detection of stationary source violations in the "pre-" and "post compliance" phases, coupled with an assessment of the extent to which the identified violations were corrected and further re-occurrence prevented.

The significance of this Task relates to the securing and analysis of source data that had not been available to public agencies prior to this time. Realizing that individual sources would be hesistant to participate in a study that might lead to an enforcement against them, it was initially agreed by all parties involved that the stationary sources visited by PES would remain anonymous to the CEQ and EPA, and the data obtained by PES would be handled confidentially. Without this assurance, sources would would not have been likely to participate in this important aspect of our study. It is with this in mind that the source performance reports presented in Chapter 2 of this report are merely identified numerically under their respective generic categories.

The objective associated with performance reports on each source was to present information describing the source, the process being controlled, the pollution control system being studied, the costs associated with the control system operation and maintenance, and factors associated with incidents of noncompliance. For the purpose of this study, a source was taken to mean a point of major discharge of a criteria pollutant.

1.3 SOURCE SELECTION METHODOLOGY

During the Task I study, a preliminary list of candidate facilities was prepared. This list was compiled during the process of probing the IEPA/CDEC regulatory programs, and was modified in-part based upon input and recommendations received from both agencies in conjunction with the EPA Project Officer. The facility list was developed utilizing an initial criteria of sixteen target source categories (ultimately eleven categories for the Chicago case due to an absence of certain source types), coupled with additional criteria including facility size, pollutant emissions, available data base, compliance track record, and current compliance status.

As would be expected, PES was not available to visit each of the initially identified facilities (due to schedule conflicts, other priorities for the facility, no desire to participate in the study, etc.), so that additional facilities had to be selected, in keeping with the above-referenced criteria. The target facility categories, the initial source distribution, and the listing of the facility types ultimately visited by PES are summarized in Table 1-1. Overall, PES targeted for the review of 20-30 sources in the Chicago case study. As indicated in the table, the ultimate result was 24 inspections which constituted the best mix of sources available considering sizes, ownership, pollutant, data availability, and compliance history.

Table 1-1 STATIONARY SOURCE LIST DISTRIBUTION

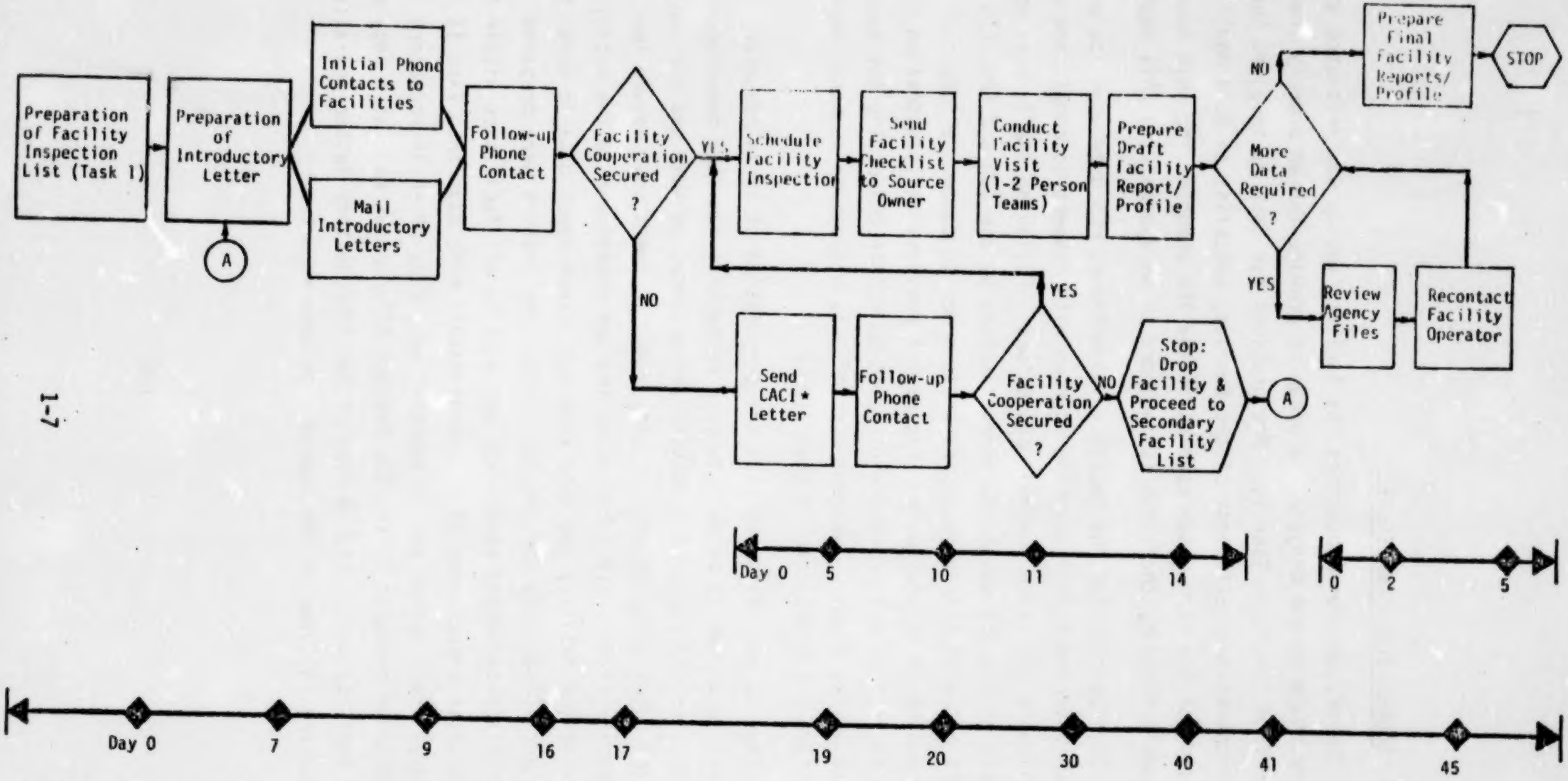
CATEGORIES	PRIMARY LIST	VISITS COMPLETED	SECONDARY LIST	VISITS COMPLETED	TOTAL
STEAM GENERATORS	4	1	2	2	3
PETROLEUM PRODUCTS AND HANDLING	2	1			1
PRINTING AND PUBLISHING			1	1	1
SECONDARY ALUMINUM	2	1	1	1	2
BRASS AND BRONZE	2	1	2	NONE	1
PETROCHEMICALS	3	3	NONE	NONE	3
MINERAL PROCESSES	2	1	2	2	3
GRAIN HANDLING	1	1	1	NONE	1
LUMBER AND WOOD PRODUCTS	2	1	1	1	2
FOOD PRODUCTS	2	1	1	1	2
SURFACE COATING	5	2	3	3	5
TOTAL SOURCES	25	13	14	11	24

1.4 SOURCE VISIT PROCEDURES

The process for conducting the facility visits was initiated at an early stage in the project, in order to provide for an orderly transition from Task I to Task II. Preparations for Task II involved the development and refinement of the facility checklist (i.e. a modified version of the form which appears in the PES proposal for this study). A sample facility checklist is included in an appendix to this report.

In preparing for the facility inspections, PES drew upon its previous experience in inspecting sources with respect to compliance with applicable pollution control regulations. Following the initial approval of the PES developed source listing by the CEQ and EPA, PES staff met with EPA Project Officer in order to conduct a "dry run" of the source visit procedure. Figure 1-1 provides an illustration of the facility visit procedure utilized by PES in conducting the second phase of the study. The remainder of this discussion is based upon the flow chart depicted in that figure.

Task II was initiated with the preparation of an introductory letter which was to be sent to each respective facility owner/operation. The content of the letters was critical as they had to: solicit the cooperation of the facility owner in the study; assure the anonymity of all data gathered during and subsequent to the visit; and provide the facility operator with sufficient input data in order to prepare effectively for the PES visit. The letters were prepared within approximately seven days and sent to all facilities within two days after preparation (i.e. approximately nine days into Task II study). Each letter was accompanied by a copy of an introductory memorandum prepared by the CEQ Project Officer, as well as a copy of the facility checklist. A copy of the introductory letter and attachments are included in the appendix to this report.


Preparation of Facility Inspection List (Task 1)
Preparation of Introductory Letter
A
Initial Phone Contacts to Facilities
Mail Introductory Letters
Follow-up Phone Contact
Facility Cooperation Secured ?
YES
NO
Schedule Facility Inspection
Send Facility Checklist to Source Owner
Conduct Facility Visit (1-2 Person Teams)
Prepare Draft Facility Report/ Profile
More Data Required ?
NO
YES
Prepare Final Facility Reports/ Profile
STOP
Review Agency Files
Recontact Facility Operator
Send CACI* Letter
Follow-up Phone Contact
Facility Cooperation Secured ?
YES
NO
Stop: Drop Facility & Proceed to Secondary Facility List
A
Day 0
5
10
11
14
0
2
5
Day 0
7
9
16
17
19
20
30
40
41
45

* Chicago Association of Commerce and Industry

Figure 1-1 FACILITY VISIT PROCEDURE

Follow-up phone contacts were made to each facility within one week of the initial mailing. In many instances, PES found that the introductory letters had been "side-tracked", and that the follow-up calls were successful in resurfacing the letters and in assuring that the letters were received by the appropriate addressee. However, at this point, PES also found that only approximately a 35 percent favorable response towards participation in the study was being achieved. As indicated in Figure 1-1, PESsolicited the assistance of the Chicago Association of Commerce and Industry (CACI) in order to reinforce our efforts at securing industrial support for the study. As a result, the CACI environmental committee drafted a letter to all facilities which, at that time, were still reluctant to participate in the study. The CACI letters were prepared and mailed within five days (i.e., nineteen days into the study). A copy of the CACI letter is included in the appendix.

The CACI letters were followed by phone contacts within five days to attempt to resolve any concerns preventing the participation by the facility. The CACI effort was successful in elevating the level of participation to 80 percent of the facilities initially contacted. As illustrated in Figure 1-1, any facilities still reluctant to participate at that point were dropped from further consideration; other facilities were then added from the secondary list. While the CACI assistance was helpful in securing the cooperation of additional facilities, the effort also consumed a minimum increment of fourteen additional days.

Once facility visits were scheduled, additional copies of the facility checklist were furnished to the owner/operator in order to fully prepare all meeting participants. The actual on-site visits were normally conducted within ten days of scheduling (i.e., approximately 30-44 days into the study, depending upon whether the facility consented to a visit after the first or second mailing). Each visit was conducted by 1-2 members of PES's technical staff. For larger facilities, the 2-person teams were more effective in gathering greater amounts of data within the shortest possible time frame. This was achieved by assigning one person to concentrate on the facility owner/operation (or other senior staff individual in attendance at the meeting), while a second individual conducted a review of facility files or spoke to other facility staff engineers. A typical facility visit involved first a general discussion of previous experiences and interactions with the regulatory agencies (i.e., IEPA, CDEC, and U.S. EPA). This type of conversation tended to relax meeting participants, and remove potential barriers to full information gathering. The meeting then moved to a discussion of the actual processes and pollutants involved, followed by a more lengthy discussion of control devices installed (including costs), and the permit/enforcement experiences related to the installation of the control equipment. Next, the meetings focused on any remaining areas of noncompliance, and the reasons therefore. Finally, the discussions turned to a review of any on-going or planned operation and maintenance (O & M) programs at the facility. At that point, the meeting participants were also asked for any recommendations that they may have regarding improvements or changes needed in the current regulatory system. Prior to leaving each facility, a tour was usually provided to review the processes and/or control equipment discussed during the meeting.

Following the facility visit, all data gathered were analyzed and compared to the data compiled from control agency files on each facility prior to the on-site visit. Any discrepancies, apparent errors or missing data required a recontact of either the control agencies, the facility, or both for more information. As illustrated in Figure 1-1, the entire process resulting in the preparation of the facility histories and associated emission/compliance profiles required approximately 45-65 days, depending upon the initial commitment of facilities to cooperate and the availability of required data.

1.5 ORGANIZATION OF THE TASK II REPORT

The remainder of the Task II report is organized around the results for the stationary source compliance data and emission profiles. Section 2.0 of the report presents the source profiles, agency/source interaction summaries and emission data in source category groupings. The information is presented in this way in order to provide for a trends and conclusion by source category in Section 3.0.

In Section 3.0, facility category comparisons and conclusions are presented. The discussion focuses upon economic considerations with respect to facility compliance (or non-compliance), as well as abatement related to operating and maintenance (O & M) costs, where applicable. Finally, the section analyzes the technical and/or non-technical reaons for facility compliance. Summary tables are presented which review the percent of exceedances/percent of compliance by source category, as well as the number of exceedances per year (plus duration) by source category.

2.0 COMPARISONS AND CONCLUSIONS

2.1 ECONOMIC CONSIDERATIONS

The financial data presented in the facility reports indicates a wide range of costs related to pollution control, even within the same source category. The apparent reasons for economic variability tends to stem from the fact that, within a given source category, pollution control costs will vary as a function of facility (size, age, pollutants, space limitations, etc.); process (equipment design, throughput rates, material recoverability potential, etc.); and control equipment availability (technological development stage, equipment suppliers--number and location, reliability, etc.). All of these "tangible" considerations, of course, are then weighed by corporate management against other "intangible" economic considerations such as incentive (or disincentives) to comply (or not to comply) with a given set of control regulations. This interaction is depicted in Figure 2-1.

As illustrated in the figure, the economic considerations may or may not be related across source categories, as a function of whether or not similar control equipment and/or pollutants are involved, coupled with the financial stability of each particular industry. The facility interview process indicated that the economic considerations in the pollution control area are not merely the "cost of compliance", but instead, represent the outcome of a complex (although somewhat unstructured) decision process. The decision process, itself, must necessarily focus on tangible, intangible, internal, and external economic considerations, and that each of these parameters may receive different priorities (i.e., decision making "weights") within each different facility.

With all of the economic decision parameters identified in Figure 2-1 in mind, no clear trend emerged through the facility interview process regarding economic considerations within or between source categories, with the exception of costs associated with "proven" technology. That is, industry appeared to be more willing to commit to

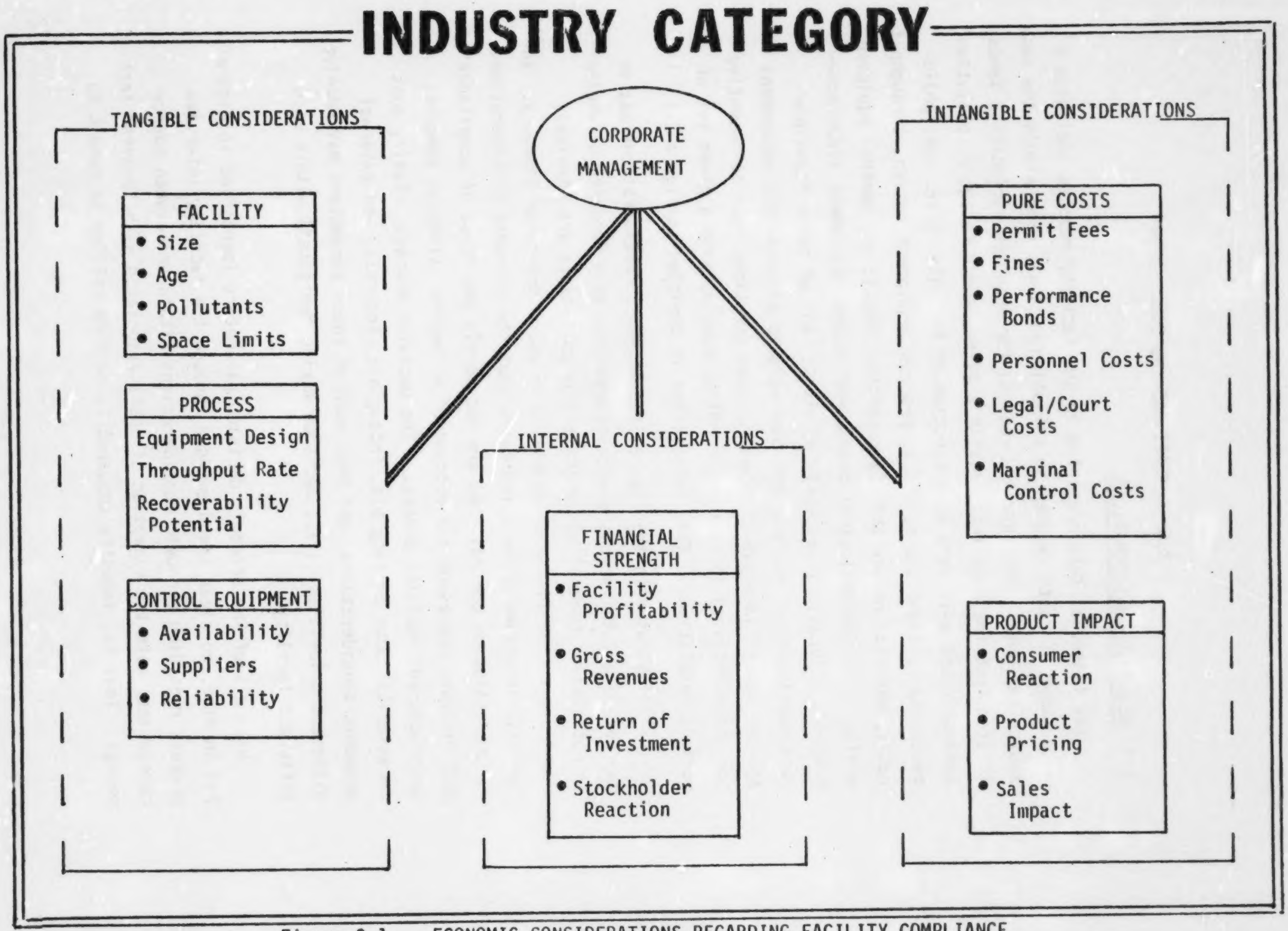

INDUSTRY CATEGORY
CORPORATE MANAGEMENT
TANGIBLE CONSIDERATIONS
FACILITY
• Size
• Age
• Pollutants
• Space Limits
PROCESS
Equipment Design
Throughput Rate
Recoverability Potential
CONTROL EQUIPMENT
• Availability
• Suppliers
• Reliability
INTERNAL CONSIDERATIONS
FINANCIAL STRENGTH
• Facility Profitability
• Gross Revenues
• Return of Investment
• Stockholder Reaction
INTANGIBLE CONSIDERATIONS
PURE COSTS
• Permit Fees
• Fines
• Performance Bonds
• Personnel Costs
• Legal/Court Costs
• Marginal Control Costs
PRODUCT IMPACT
• Consumer Reaction
• Product Pricing
• Sales Impact

Figure 2-1 ECONOMIC CONSIDERATIONS REGARDING FACILITY COMPLIANCE

pollution control equipment investment for devices not requiring state-of-the-art technology (i.e., electrostatic precipitators, baghouses, etc., as opposed to small scrubber installations).

Table 2-1 presents economic comparisons by industry category, as compiled through the facility visits. The data are structured in an attempt to isolate pollution control costs incurred by complying and non-complying facilities. In addition, where such data were available, cost information is presented for stationary source abatement-related operation and maintenance (O & M) programs. In all instances involving O & M expenditures, such costs represent estimates of personnel-related and/or equipment repair costs as gathered through the interview process. Personnel costs in some instances represent a fraction of the total overall costs for the facility-wide routine maintenance program.

Table 2-2 presents cost data as a function of capital and operating costs for various types of control equipment. Cost data presented in both tables are constant 1978 dollars.

As illustrated in Table 2-1, the largest expenditures by source category (for those facilities visited in the case study) are within the steam generating and secondary aluminum categories. The high expenses reflected for the former category represent a combination of costs associated with TSP control (i.e., electrostatic precipitators) and SO_2 control (i.e., coal conversions and/or scrubbers) for large boilerhouse operations.

The O & M costs are a combination of estimated personnel and equipment maintenance costs (for those facilities visited in the case study). For the most part, the estimated annual costs are proportioned from overall facility maintenance costs. Only one facility visited (a utility) had a prepared, written O & M schedule for control equipment. In this instance, the facility based its O & M program around ESP maintenance during scheduled and forced outages. The high costs reflected for O & M under the surface coating category are based upon large scale-solvent switching and assosited equipment maintenance. It

Table 2-1 ECONOMIC COMPARISONS

SOURCE CATEGORY	STATIONARY SOURCE CAPITAL COSTS*		ANNUAL ABATEMENT-RELATED O & M COSTS (APPROXIMATE)
	IN COMPLIANCE	NON-COMPLIANCE	
STEAM GENERATING	$3,000-$8,000,000		$20,000-$40,000/unit
PETROLEUM PRODUCTS	NA		$10,000-$20,000/facility
PRINTING AND PUBLISHING	$45,000-$90,000		$20,000-$30,000/facility
SECONDARY ALUMINUM	$600,000-$1,000,000		$50,000-$100,000/facility
LUMBER AND WOOD PRODUCTS	$65,000-$150,000	$25,000-$45,000	
FOOD PRODUCTS	$50,000-$600,000		$6,000-$10,000/unit
SURFACE COATING	$50,000-$300,000	NA	$150,000-$250,000/facility
BRASS AND BRONZE	NA		
CHEMICALS	$15,000-$220,000		$15,000-$20,000/process (up to 5 processes/facility)
MINERAL PROCESSES	$250,000-$370,000	$80,000	$20,000-$30,000/facility
GRAIN HANDLING	$25,000-$250,000		$15,000-$50,000/facility

N.A. = Not Available

*All Costs Rounded to Nearest $1,000

Table 2-2 STATIONARY SOURCE CONTROL EQUIPMENT TYPES/COSTS

CONTROL EQUIPMENT APPROACH	APPROXIMATE UNITS ENCOUNTERED	CAPITAL COST RANGE	ANNUAL OPERATING COST RANGE
• BAGHOUSES	60+	$3,000-$275,000	$1,000-$3,000/unit
• ELECTROSTATIC PRECIPITATORS	8	$8-$12,000,000	$500,000-$1,000,000 [1]
• FUEL CONVERSIONS (COAL-COAL)	3	$7-$8,000,000 [2]	$6-$8,000,000 [3]
• FUEL CONVERSIONS (COAL-OIL/GAS)	3	NA	NA
• AFTERBURNERS	4	$75,000-$300,000	$25,000-$90,000
• SCRUBBERS	5	$250,000	N.A. [4]
• PROCESS/EQUIPMENT CHANGE	5	$23,000-$100,000	($100,000 profit)-$250,000

NOTES:

1. O & M costs based on mills/kwh
2. Capital costs based on boiler derate to meet SO_2 requirements (approx. $300/kw)
3. O & M non-fuel related costs: mills/kwh; fuel costs cents/10^6 BTU
4. O & M costs related to largest scrubber not available; unit failed to perform properly after installation and was replaced by baghouse operation

should be noted that the annual abatement-related O & M costs (Table 2-1) have been estimated by PES under the following set of assumptions:

Approximate annual salary for experienced control equipment maintenance engineer = $20,000

Therefore, manpower related O & M costs are equal to:

(Total estimated equipment maintenance personnel costs per facility in man years)

x (Percent of total facility maintenance devoted to pollution control equipment)

x ($20,000/man-year)

Other equipment-related O & M costs (if available from or estimated by the facility opeator during the interview) are then added to the manpower costs.

2.2 TECHNICAL REASONS FOR COMPLIANCE

This section reviews the technical reasons for compliance based upon the results of the facility site visits. The information, again, is based upon the specific source categories encountered. In general, however, the technical reasons for compliance (or, conversely, non-compliance) across the various source categories appear to be a function of the available control technology for a given process/pollutant (e.g., fuel combustion control for TSP versus SO_2); the size or throughput of the operation; the age of the facility (which includes available space considerations); lead times for control equipment design, ordering, delivery and construction; and the availability of control equipment suppliers. With respect to the three criteria pollutants under consideration (TSP, SO_2, HC), control technology appears to be much more developed for TSP than for SO_2 of HC (with the exception of "fugitive" TSP emissions from unconfined processes or loading operations).

Figure 2-2 depicts a relative comparison of available pollutant control technologies among the three pollutants. The figure is not intended to illustrate absolute values, but instead, indicates the trend of control technologies development as they effect various industries in the Chicago case study. For example, TSP controls for large fuel combustion operations (i.e. 250 million Btu/hour heat input) have been relatively well developed (e.g., baghouses, electrostatic precipitators, etc.). On the other hand, TSP controls for fugitive dust emissions are less developed, as such controls usually require extensive, expensive holding configurations. As illustrated in the figure, the source categories having the greatest difficulty in attaining and maintaining compliance for technical concerns, are those facilities involving TSP fugitive dust emissions (i.e., opacity violations) and SO_2 emissions from small boiler operations (i.e., violations on percent S content in off-gases or lbs SO_2 per 10^6 Btu of heat input). A discussion of technical reasons for facility/point source compliance folows.

As discussed at the beginning of this section, it appears that (based upon the facility interviews) technical reasons for compliance centered around the application of more "proven technology". That is, where the facilities were able to purchase and utilize standardized, "packaged" control devices, as opposed to the utilization of control equipment designed as an add-on to the existing facility process. For example, it was found that in the steam generating, printing and publishing, and mineral processes source categories, compliance problems were less apparent when properly designed electrostatic precipitators (ESPs) and/or baghouses were utilized. However, in other instances such as in the lumber and wood products category, compliance problems were encountered when special "filtering systems" were built to control TSP emissions from wood waste boiler operations. Problems here were usually of a design nature, where periodic burnouts of filtering media led to non-compliance with applicable emission limitations.

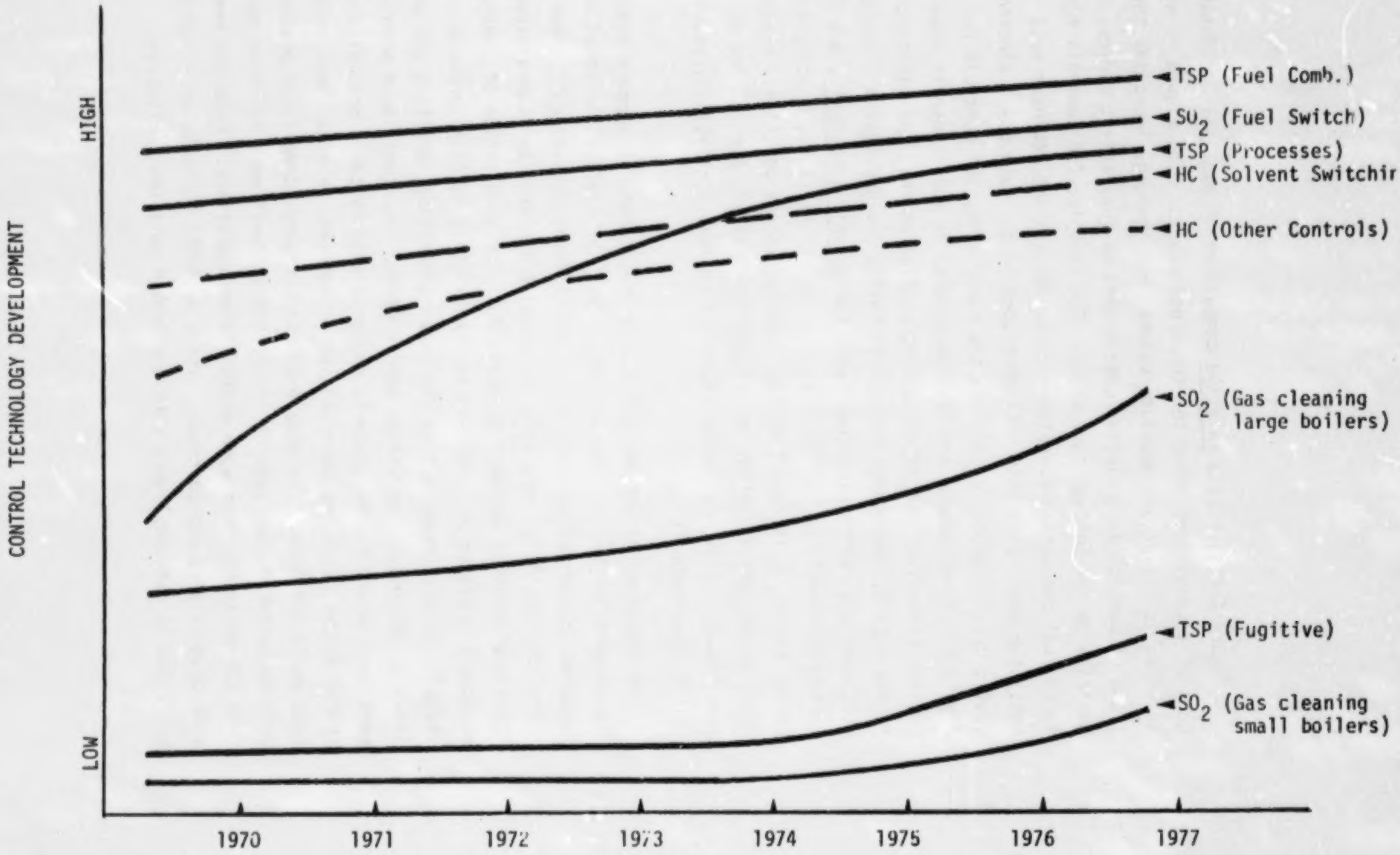


FIGURE 2-2 CONTROL TECHNOLOGY DEVELOPMENT BY POLLUTANT
CHICAGO CASE STUDY

In other instances involving multiple pollutant control, or the control of SO_2 or HC, most control efforts centered around fuel conversions and/or solvent switching to meet applicable control requirement. In a few cases, such as in the printing and publishing category, the facility operators indicated that afterburners would have been a more effective control technology for TSP/HC. However, ESPs were chosen to control TSP only, due to state enforcement priorities placed upon TSP control over HC control.

Finally, other technical problems cited regarding compliance related to the timely construction and installation of ordered control equipment, as well as poor equipment performance during startup. For example, in the grain handling and/or lumber and wood products categories, problems were encountered by the facility where baghouses/ESPs were not completed and installed on schedule. In these instances, multiple units were being installed over a period of time as part of a comprehensive compliance schedule. However, delays encountered on certain units caused some disruption to the overall schedule, leaving the facility liable to the city or state agencies for continued non-compliance. Further, equipment startup problems due to improper selection of baghouse collection bag material or design of ESP particulate collection plates caused similar delays to the overall compliance schedule.

Table 2-3 below summarized the various technical reasons encountered for facility non-compliance. The reasons are ranked in their approximate order of frequency of occurrence based upon the facility visits.

2.3 NON-TECHNICAL REASONS FOR COMPLIANCE

As a result of the facility visits, it is apparent that the non-technical patterns for compliance that emerge are more of a function of regulatory agency actions than activities specific to a particular source category. That is, the reasons for compliance expressed by industry appeared to be a function of the type of action or policy

Table 2-3 FACILITY INITIAL COMPLIANCE HISTORY

ISSUE/CAUSE	FREQUENCY
▶ Control equipment construction/installation schedules not met	HIGHER
▶ Proper equipment design	
▶ Proper equipment installation	
▶ Control of single/multiple pollutants	
▶ Use of proven control technology (i.e., use of packaged add-on devices over specially built control equipment as part of actual facility process)	
▶ Control of specific point sources vs. fugitive emission points	
▶ Poor equipment performance after startup (lack of vendor guarantees)	
▶ Lack of adequate provisions (i.e., facility safeguards) accounting for application of control technology-forcing techniques	LOWER

adopted by the regulatory agency. For example, some facility categories such as grain handling and food processes indicated that the facilities entered into compliance programs either as a voluntary action (i.e., at the initiative of the facility owner/operator prior to being approached by a particular control agency), or as the result of a working relationship established between the facility(ies) and the control agency.

On the other hand, some industries indicated that the facility placed a lower priority on compliance (such as the mineral process or printing categories), but that steps were taken to comply after receipt of a notice of violation or an initiation of enforcement/legal proceedings. Still other categories (e.g., lumber and wood products) developed low-level exploratory compliance programs (i.e., paper studies of potential control equipment) due to passive city/state enforcement actions against that category. Finally, other industries (such as facilities within the food product category) were actually in compliance with various administrative procedures (i.e., operating without the proper permits).

Table 2-4 lists the approximate ranking of various compliance related elements in terms of the frequency that the elements were cited by industry during the facility visits. The rankings are only approximations since in most instances, multiple reasons were cited by the facility representatives.

It is interesting to note that the permit system appears to serve as an effective tool in bringing about compliance primarily from the standpoint of putting the control agency in contact with the facility. That is, the permit system tends to serve as a mechanism for bringing facilities into the regulatory system. However, depending upon how the facility-control agency communications/interactions proceed from the initial point of contact, the path may or may not ultimately lead to compliance.

Table 2-4 INITIAL COMPLIANCE HISTORY NON-TECHNICAL PRIMARY MOTIVATORS CITED BY INDUSTRY

MOTIVATOR	FREQUENCY
▶ State permit system	HIGHER
▶ Decision that voluntary compliance may give facility more flexibility in ultimate compliance approach/schedule	↑
▶ Decision by industry that delay tactics/costs would exceed initial costs of compliance	
▶ Adverse publicity associated with non-compliance (i.e., through city ticketing system, newspaper articles, TV news articles)	
▶ Threat of litigation/enforcement actions	
▶ Pressure from continued periodic inspections (i.e., IEPA inspections; CDEC roving inspectors)	↓
▶ Override authority (city vs. state) in finalizing compliance schedules	LOWER

Another point that appeared to arise frequently during the facility interview process was the interrelationship between economics, the regulatory process, and the corporate decision to comply or not to comply. That is, in a rather involved and unstructured process (discussed further in Section 2.1 "Economic Considerations"), the facility owner/operator will attempt to weigh the decision as to whether or not tactics/costs associated with delaying compliance may exceed the ultimate costs of compliance. This factor appeared to weigh more heavily with industry than the mere threat of litigation or enforcement action.

Other factors appearing to arise more frequently within some source categories (e.g., grain handling, lumber and wood products) was the consideration that immediate voluntary compliance may give the facility greater overall flexibility in terms of negotiating the ultimate compliance strategy and/or time schedule. This appeared to be the case with facilities that were seeking to "trade-off" the more readily controlled emission points against more difficult to control (i.e., fugitive) emission points. One factor that appeared to weigh more heavily against speedy compliance was the potential override authority between city and state agencies. This situation apparently tends to add a measure of confusion to the compliance process, as viewed from the perspective of the facility owner/operator. As illustrated in several of the case studies, facilities who had attempted to comply with state enforcement initiatives by installing control equipment ultimtely faced local notices of violations aimed at upgrading newly installed equipment and/or controlling additional processes. This situation also appeared to occur in the reverse (i.e., IEPA overriding CDEC activities).

Finally, another "motivator" that appeared to weigh in the facility decision process was the potential for adverse publicity associated with non-compliance. Several studies indicated the use of publicity which brought about both favorable and unfavorable facility reactions. Where the facility was fully aware of its non-compliance status and was purposely pursuing delay tactics, adverse public notices regarding the continued non-compliance appeared to result in steps by the facility to comply. In another instance, the public notification appeared to be premature in that the facility owner was not aware of his non-compliance status until he saw it discussed by a regulatory agency on television.

Overall, the preliminary indications resulting from the facility interviews are that--in terms of non-technical considerations--a strong permit system used in conjunction with a high degree of control agency/facility interaction may be most effective in bringing about facility actions aimed at initial compliance. The system effectiveness may be enchanced through the selective use of public notification, enforcement/legal proceedings, and the convincing of the facility owner/operator that ultimate compliance is more cost-effective than delay tactics.

2.4 CONCLUSIONS

2.4.1 INTRODUCTION

Sections 2.1 to 2.3 provided a summary overview of the data collected through the facility interviews. The overall scenario depicted is admittedly complex, with many factors weighing into the decision process to comply with a given set of emission limitations. With respect to initial compliance, factors included in the facility decision process range from the costs of initial compliance vs. the costs/implications of relaying compliance; the scope of interactions between the regulatory agency(ies) and the subject facility; and the compliance-related "tools" utilized during the deliberation process. In general, the overall success ratio with respect to inital compliance appears to be skewed towards the availability of proven control technology--such as in the case of controlling TSP fuel combustion emissions vs. the control of SO_2 emissions (with add-on equipment).

2.4.2 NATURE AND APPARENT CAUSES OF THE OPERATION AND MAINTENANCE (O & M) PROBLEM

In terms of continued compliance by facilities, the data gathered to date is even more complex. Overall, the data gathered appears to indicate a sporadic problem of facilities not maintaining compliance once control equipment is in place. The limited data and facility records available prevents precise quantification of the O & M problem; however, the nature of the problem appears to be centered around a lack of historical programmatic emphasis. Table 2-5 summarizes the various factors that appear to contribute to the O & M problem.

As illustrated in the table, the O & M problems stem from the apparent lack of uniform national or state program guidance. That is, little information exists to educate industry regarding the proper preparation, implementation, and funding of a pollution control equipment O & M program. In particular, little guidance exists which explains to industry the full benefits of a properly structured and conducted O & M program. Coupled with the lack of O & M program emphasis is the historic and continued emphasis of initial compliance by industry. As a result, greater consideration is given to the budgeting for initial capital expenditures for control equipment, as opposed to also budgeting for the proper care and maintenance of control equipment once installed at the facility.

Any emphasis on O & M programs uncovered during the facility interview process appeared to be a function of "need", as well as the normal equipment maintenance program already in existance at the particular facility. That is, for pollutants such as TSP resulting in visible emissions, any control equipment malfunction would normally result in a nuisance/complaint situation for the facility. Therefore, some facilities with TSP control equipment (i.e., baghouses, ESPs, etc.) placed greater emphasis on routine maintenance and quick-response malfunction repairs. Also, at facilities whose owner/operator appeared to place higher priority on routine facility maintenance

TABLE 2-5

OPERATION AND MAINTENANCE PROGRAMS

- APPARENT PROBLEM CAUSES -

- Lack of uniform program guidance for industry use regarding preparation/implementation/funding of adequate control equipment O & M programs.

- Lack of overall emphasis in O & M of control equipment; resulting in much greater emphasis on facility budgeting for initial capital expenditures for control equipment vs. O & M budgeting.

- O & M efforts appear to be a function of the pollutants involved (i.e., visible vs. gaseous emissions), coupled with the potential for recoverable products.

- Apparent development of partial O & M programs as a small portion of the overall facility equipment maintenance program.

pollutant control equipment O & M was practiced as a portion of the overall facility maintenance program. Even here, however, it was difficult to isolate specific steps and/or time allocated to control equipment O & M as this represented only a small portion of the responsibilities normally assigned to equipment maintenance personnel.

2.4.3 PRINCIPAL ACTORS INVOLVED IN O & M PROGRAMS

In reviewing the apparent problems associated with the development and implementation of equipment O & M programs, the facility interviews also highlighted the "principal actors" who interact (or should interact) in the program. Table 2-6 lists several of the preliminary observations raised through the facility discussions.

Most notable through the interview process is that, in the absence of uniform O & M program guidance, the facility owner/operator coordinates the development of the program as a function of his own interest in such programs; that is, a facility that maintains a strong equipment maintenance program tends to include control equipment O & M, and does so at the direction of the facility/owner operator. Further, the staff engineers assigned to the general equipment maintenance appear to also be the individuals assigned to pollution control equipment O & M. Typically, the O & M programs developed at the facilities encountered appeared to be relatively unstructured and based upon trial and error. Also noteworthy was the fact that the O & M programs were apparently facility-specific, with little or no sharing of O & M practices/data between facilites under the same management.

From the control agency personnel perspective, little direction or guidance appeared to flow from the control agencies to the facilities regarding O & M planning. The only direction given tended to relate to control equipment malfunction reporting requirements, and "canned" information regarding equipment O & M that may be supplied through equipment vendors.

TABLE 2-6

OPERATION AND MAINTENANCE PROGRAMS

--PRINCIPAL ACTORS--

- Facility Manager/operator coordinates development of O & M effort specific to that facility.
- Staff engineers assigned to general maintenance of all equipment (not only control equipment) at the facility, assigned to O & M work.
- Limited exchange of data regarding O & M practices between facility managers under same owner.
- Management gives little or no direction to facility operators regarding O & M programs.
- Control agencies give little direction regarding O & M planning, most direction only in the context of malfunction requirements and reporting.
- Small companies (100 or less employees) usually assign someone in senior management assistant to Corporate Vice President assigned as environmental contact.
- Medium-large companies, 100-1000 employees usually assigned to individual at district manager level (i.e., responsible for several facilities) to serve as environmental contact.
- Large companies usually coordinated by environmental control department.

Finally, from the facilities interviewed, PES has attempted to pinpoint any O & M related patterns as a function of facility size. The preliminary conclusions are also listed in the previous table.

2.4.4 EXTENT OF THE NON-COMPLIANCE PROBLEM (TABLE 2-7)

Based upon the data generated through the facility interviews and coupled with the review of appropriate IEPA/CDEC industry files, PES has attempted to characterize the "extent" of the non-compliance problem as a function of industry category. It should be noted that, in some instances, only one or two facilities were interviewed in a given source category, which may not be sufficient in serving as a baseline for drawing conclusions with respect to non-compliance across a particular source category. For the purposes of completing the table, a violation has been defined as "one or more excursions (exceedances) within a 24-hour period, out of a possible total of 365 days per year." Thus, one exceedance would be counted as:

(1 violation/24 hours) = 1 exceedance day

1 day/365 days per year 0.27% out of compliance

Two or more exceedances during the same 24 hour period would not change the percentage total. However, two exceedances - each on separate days would imply:

2 exceedances days/365 days per year = 0.55% out of compliance

It should be noted that the total number of exceedances indicated in the same table represents a composite (if applicable) for a given source category which includes the three criteria pollutants of concern (TSO, SO_2, HC) in this study.

3.4.5 PRELUDE TO TASK 3

During the next phase of this study (i.e., Task 3), PES will combine the results of the Task 1 study (the analysis of the IEPA/CDEC regulatory programs, practices, policies, and funding within the City of Chicago); with the results of this phase of the study; in order to

Table 2-7 MAGNITUDE OF EXCESS EMISSIONS

SOURCE CATEGORY	PERCENT EXCEEDANCES OVER 7 YEARS	PERCENT COMPLIANCE OVER 7 YEARS	NO. OF EXCEEDANCES/YR (AVERAGE OVER 7 YEARS)	DURATION
Steam Generators	.2 %	99.8 %	.71	continuous
Petroleum products	0 %	100 %	0	- - -
Printing & Publishing	75 %	25 %	274	continuous
Secondary Aluminum	86 %	14 %	313	continuous
Brass & Bronze	0 %	100 %	0	- - -
Chemicals	39 %	61 %	143	continuous
Mineral Processes	43 %	57 %	156	continuous
Grain Handling	100 %	0 %	365	continuous
Lumber & wood products	79 %	21 %	287	continuous
Food Products	93 %	7 %	339	continuous
Surface Coating	55 %	45 %	202	continuous

identify any relationships between source performance and the regulatory process, and to develop proposed modifications and/or new approaches to the regulatory programs aimed at improving the stationary source response to control regulations. Table 3-8 which follows illustrates a few of the regulatory scenarios which will be examined in further detail, as a function of source category and applicable control equipment.

The regulatory alternatives listed in the table (which will be included in further analyses under Task 3) are defined below:

"A" - Construction Permit System
"B" - Operating Permit System
"C" - Annual Scheduled Facility Inspections
"D" - Annual Unscheduled Facility Inspections
"E" - Source Emission Testing
"F" - Mobile Inspectors
"G" - Extensive Negotiation (in lieu of enforcement and/or litigation)
"H" - Extensive Enforcement/Litigation
"I" - "G" and "H"
"J" - Emissions Fees/Taxes (Pollutants Disincentives)
"K" - Expanded Tax Writeoffs (Control equipment incentives)
"L" - Expanded Provisions for Technology-Forcing Controls (Control equipment incentives)
"M" - O & M Program Guidance/Incentives

The above list is intended to represent possible example scenarios for further review during Task 3. The list is not intended to be all inclusive, as additional regulatory alternatives may also be considered. The purpose of the table is to present only preliminary findings in need of further study.

Table 2-8 POTENTIAL RELATIONSHIPS BETWEEN SOURCE COMPLIANCES AND ALTERNATIVE REGULATORY APPROACHES

Source Category	Potential Control Techniques/Devices	ALTERNATIVE REGULATORY APPROACHES A	B	C	D	E	F	G	H	I	J	K	L	M
Steam Generation	Baghouse (BH)	+	+	+	+	+	+	?	+	+	?	+	?	+
	Electrostatic Precipitator (ESP)	+	+	+	+	+	+	?	+	+	?	+	?	+
	Scrubber	?	+	+	+	+	+	+	?	+	+	+	+	+
	Cyclone/Settling Chamber	+	+	+	+	+	+	?	+	+	?	+	?	-
	Fuel Switching	+	?	?	?	+	?	?	?	+	?	?	-	-
Petroleum Products	Afterburners	+	?	?	?	?	?	?	+	?	?	?	-	-
	Vapor Recovery	+	+	+	+	?	?	+	?	?	+	+	-	-
Printing and Publishing	Afterburner	+	?	?	?	?	?	?	+	?	?	?	-	-
	Solvent Switching	+	?	+	+	?	?	?	?	?	+	?	-	-
Grain Handling	Baghouse	+	+	+	+	+	+	?	?	+	?	+	-	+
	Scrubber	?	?	?	?	?	?	?	?	?	+	+	+	+
Secondary Aluminum	Baghouse	+	+	+	+	+	+	?	?	+	?	+	-	+
	Scrubber	?	?	?	?	?	?	?	?	?	+	+	+	+
Brass & Bronze	Baghouse	+	+	+	+	+	+	?	?	+	?	+	-	+
	Scrubber	?	?	?	?	?	?	?	?	?	+	+	+	+
Chemicals	Scrubber	?	?	?	?	?	?	?	?	?	+	+	+	+
	Afterburner	+	?	?	?	?	?	?	+	?	?	?	-	-
	Reformulation	+	+	-	-	-	-	?	?	?	?	?	?	?
Mineral Processes	Baghouses	+	+	+	+	+	+	?	+	+	?	+	-	+
	Scrubber	+	+	+	+	+	+	+	?	?	+	+	+	+
Lumber and Wood Products	Baghouse	+	+	+	+	+	+	?	+	+	?	+	-	+
	ESP	?	?	+	+	+	+	?	+	+	?	+	-	+
Food Products	Baghouses	+	+	+	+	+	+	?	+	+	?	+	-	+
Surface Coating	Afterburners	+	?	?	?	?	?	?	+	+	?	?	-	-
	Solvent Switching	+	?	+	+	?	?	?	?	?	+	?	-	-

The code used in the previous table is defined as follows:

"+" - Possible positive relationship (i.e., enhances compliance)

"-" - Possible negative relationship (i.e., no measurable relationship or the regulatory approach may work against compliance)

"?" - Unknown potential relationship (based upon findings to date)

3.0 STATIONARY SOURCE DATA SUMMARIES

3.1 INTRODUCTION

Each facility report contained in this section is organized by source category. As indicated in Section 1.0 (Introduction), facilities within eleven source categories were visited. The categories appear in the following sequence:

Section 3.2 STEAM GENERATORS
3.3 PETROLEUM PRODUCTS
3.4 PRINTING AND PUBLISHING
3.5 SECONDARY ALUMINUM
3.6 BRASS AND BRONZE
3.7 CHEMICALS
3.8 MINERAL PROCESSES
3.9 GRAIN HANDLING
3.10 LUMBER AND WOOD PRODUCTS
3.11 FOOD PRODUCTS
3.12 SURFACE COATING

Within each facility report, a brief description of the facility is presented. Next, an overview is provided of the key operations found at the facility, as well as a description of the pollution control equipment located on site. Any pollution control equipment identified within each facility report was inspected by PES staff during the stie visit. Following this is a presentation within each of the estimated financial impact of the pollution control efforts at each particular facility. Where possible, all cost figures are presented in actual calendar year estimates, as well as constant (1978) dollar figures.

Each facility report then focuses on an assessment of the decision making process at the source. That is, an overview is provided with respect to compliance/non-compliance decisions at the facility, coupled with interactions with the various regulatory agencies. The facility reports next include a historical overview of the source performance and problems as determined by PES staff through the on-site visit, coupled with the review of control agency records. Finally, each report presents a chronology of permit experiences by the facility, as well as a summary of documented pollution exceedances. The actual facility reports follow.

SECTION 3.2
STEAM GENERATORS

3.2 SOURCE CATEGORY: STEAM GENERATORS

3.2.1 FACILITY NO. 1

3.2.1.1 Facility Description

This facility is an institution with six oil-fired boilers, equipped with smoke indicators, capable of burning natural gas which are used for space heating steam generation. Five of the six are rated at 90,000 pounds of steam/hour alternately operated, four of which are operated in winter, one in the summer. The sixth boiler, and the primary source of the dense smoke, is rated at 150,000 pounds of steam/hour. The boilers were initially coal fired, but were converted during the 1960's to No. 6 fuel oil which was found to have a 0.92 percent sulfur content. Annual oil consumption is approximately 9.5 x 10^6 gals/year. The No. 6 fuel oil is stored in an underground tank. The facility also has a 42,000 gallon fixed roof tank for storage of their No. 2 emergency, standby fuel.

3.2.1.2 Key Operation and Pollution Control Equipment

The possible pollution from this operation would be SO_2 and particulate loading. No control equipment is fitted, but SO_2 is within compliance levels due to fuel change from coal to No. 6 fuel oil and local fuel regulations which prohibit the sale of fuel with greater than one percent sulfur content. Soot cleaning, as part of normal boiler operations, does cause excessive smoke for brief (less than fifteen minutes) periods at regular times of the day.

3.2.1.3 Financial Impact

The only potential financial impacts are incidental costs incurred in filling out permits and other regulatory liaison, and the cost differential between locally available coal and No. 6 fuel oil. No costs were calculated as fuel conversion was not made for air pollution compliance purposes.

3.2.1.4 Decision Making

The local air pollution control agency has never cited the facility for smoke violations. However, the state agency has made numerous inspections due to citizen complaints. On February 1972, a smoke (opacity) violation was noted but no further enforcement action was taken. All other inspections found the facility in compliance, although a malfunction, as detailed below, occurred during one visit (November 1972). The U.S. EPA inspected the facility in February 1976, and found it to be in compliance.

3.2.1.5 Performance and Problems

One malfunction occurred in November 1972 as a result of a feeder line malfunction which affected two main switchboards. An emergency line was utilized as the malfunction shut off all the boilers, oil, and water pumps, and the momentary contact switches. This, in turn, reduced operating pressure from 135 to 50 psia. Less pressure for maintaining proper atomizing temperature and fan operation caused the quantity of smoke which prompted the citizen complaints. This malfunction was not reported to either regulatory agency. No enforcement resulted.

3.2.1.6 Chronology of Permits and Exceedances

The state air pollution control agency granted permits for all six boilers for operation from 8/73 to 7/78, based on permit applications in 8/72. Operational permits were renewed and effective from 8/78 through 5/83.

Inspections were made by the state in 2/72, 11/72, 8/73, 4/74, and 1/77. All were made due to citizen complaints. The first inspection found a smoke violation, as noted in Section 2.2.1.4. The inspection of 11/72 found a malfunction, as detailed in Section 2.2.1.5. All other inspections, including the previously mentioned 2/76 U.S. EPA visit, found the facility in compliance. It should be noted that the local pollution control agency has taken no action whatsoever with this source (see Figure 3-1).

3.2.1.7 Emissions Profile

Since No. 6 fuel oil with a sulfur content of less than one percent (per city regulations) is used, no sulfur dioxide exceedances occurred (Figure 3-2). However, a few smoke violations occurred as noted in Section 3.2.1.6 due to equipment malfunctions.

3.2.1.8 Conclusions

The facility has been under compliance with respect to particulate and sulfur emissions; however, excessive visible emissions have occurred for brief and sporadic periods due to malfunctions. No enforcement action was taken.

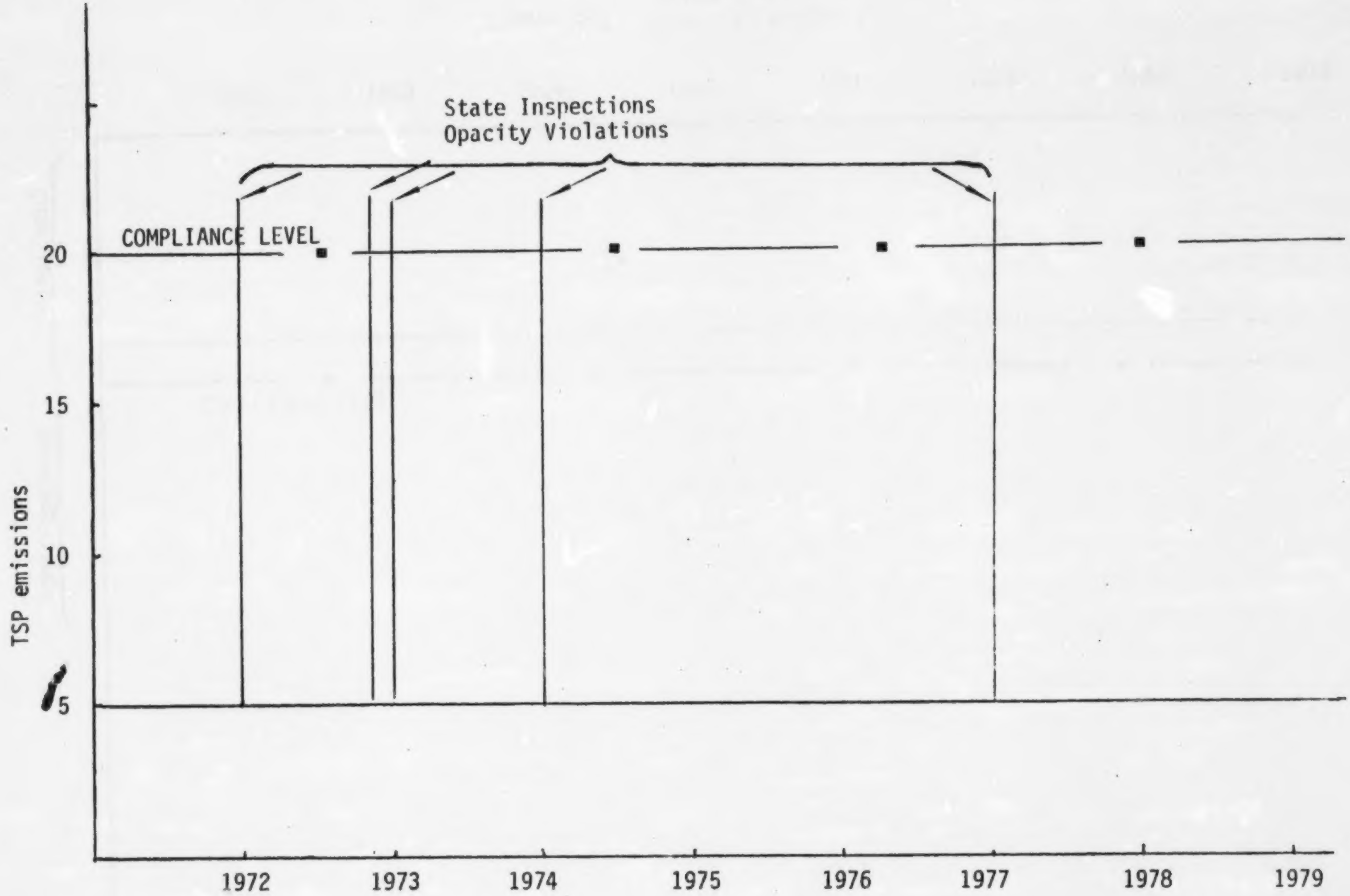


Figure 3-1. Facility Number 1
Steam generation

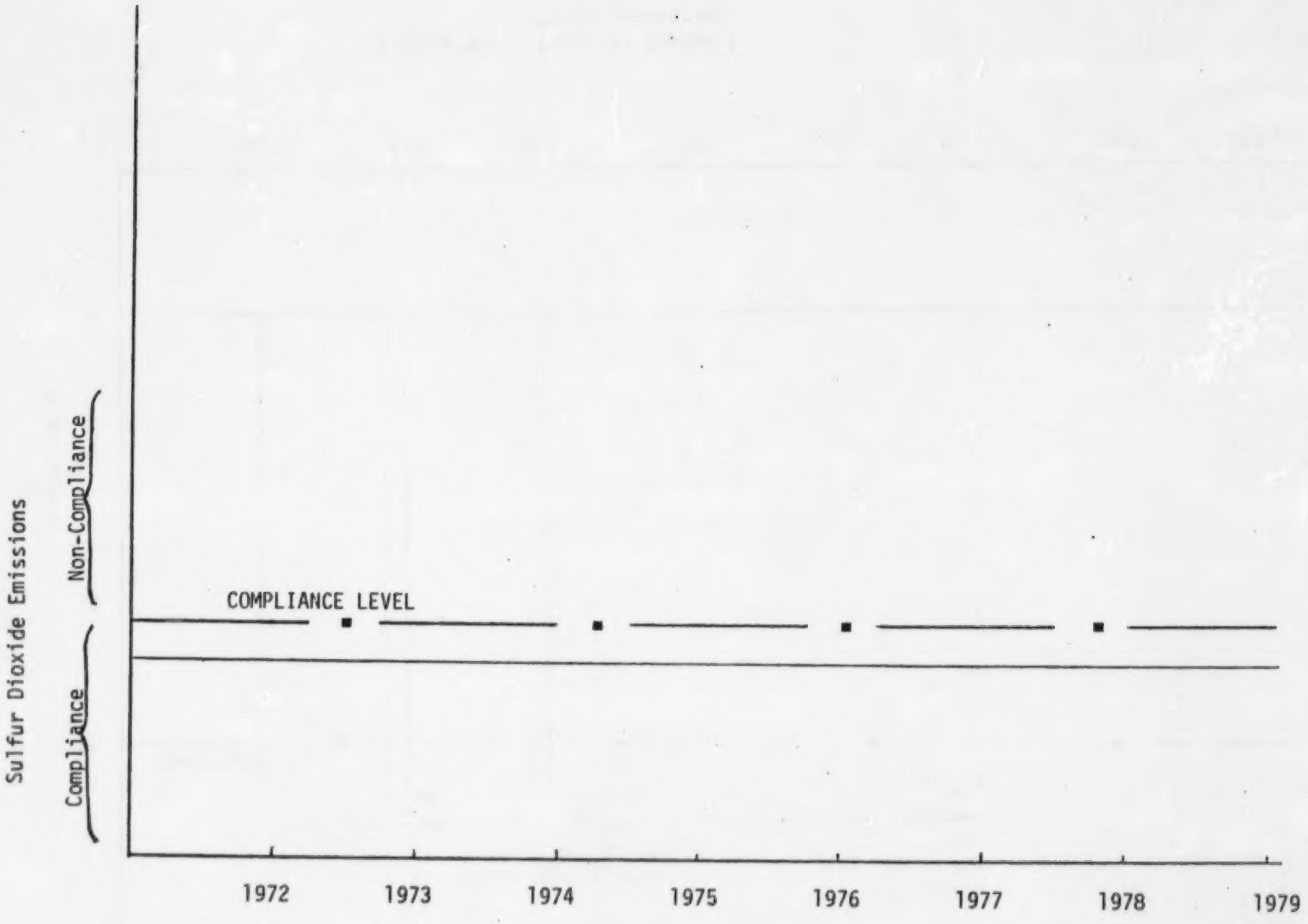


Figure 3-2. Facility Number 1
Steam generation

3.2.2 FACILITY NO. 2

3.2.2.1 Facility Description

At this facility, high temperature and pressure (400^{0}F/350 psi-winter; 350^{0}F/325 psi-summer) water is fed through underground piping to heat exchangers with the buildings. The heat is supplied by four "International", watertube, high temperature, hot water, forced circulation boilers with "Todd burners with a capacity of 75 MBTU/hr. They are interruptable gas or No. 6 oil fired, and utilized gas eight months out of the year from 1964 to 1970. Since that time, gas has not been readily available, and they have steadily increased their oil use. The oil has a one percent sulfur content in winter, and approximately one percent in summer. The maximum load is 200 MBTU/hr which is supplied by three boilers with one as a standby.

3.2.2.2 Key Operations and Pollution Control Equipment

Due to local regulations, present fuel oil must be less than one percent sulfur content. The oil purchased by this facility is independently tested monthly as to sulfur, ash and BTU content. Although No. 6 fuel oil and gas are used, the source has installed at their own initiative a small baghouse to control the soot blowing nuisance. The source operates 12 hours/day, 7 days/week, 45 weeks/year. Soot is blown with an air jet once every 24 hours.

3.2.2.3 Financial Impact

Financial impacts are related to the baghouse which was installed at the source's initiation, and the increased use of oil due to the high cost and unavailability of natural gas. Costs were not calculated as neither decision was for compliance purposes and both were the facility's choice. Estimated cost magnitude for the baghouse is in the range of $2500.

3.2.2.4 Decision Making

The state air pollution control agency has inspected this facility and granted permits. The local air pollution agency has no record of any kind of action with this source. From this basis, it can be deduced that the decision making process at this source is motivated by factors other than regulatory agency disincentives, as they voluntarily installed controls to appeas local citizens in the absence of any agency demands.

3.2.2.5 Performance and Problems

The source has never been cited for excessive smoke, although citizen complains to soot blowing prompted baghouse installation. The source reports no maintenance problems since the fall of 1964.

3.2.2.6 Chronology of Permits and Exceedances

On April 3, 1975, the source applied for an operating permit. Upon review of the permit information, the state agency on April 16, 1973 informed the source that it might not need a permit, and solicited a permit application withdrawal documentation. On May 15, 1975, the source did request such a withdrawal, which was granted on May 21, 1975.

3.2.2.7 Emissions Profile

Since the source uses boiler fuel with less than one percent sulfur content (per city requirements), no sulfur dioxide violations are cited (Figure 3-3). Actual sulfur dioxide emissions in relation to energy demands are also shown in Figure 3-4.

3.2.2.8 Conclusions

The facility is under compliance with respect to all applicable regulations. Actually, no permits were needed to operate this facility.

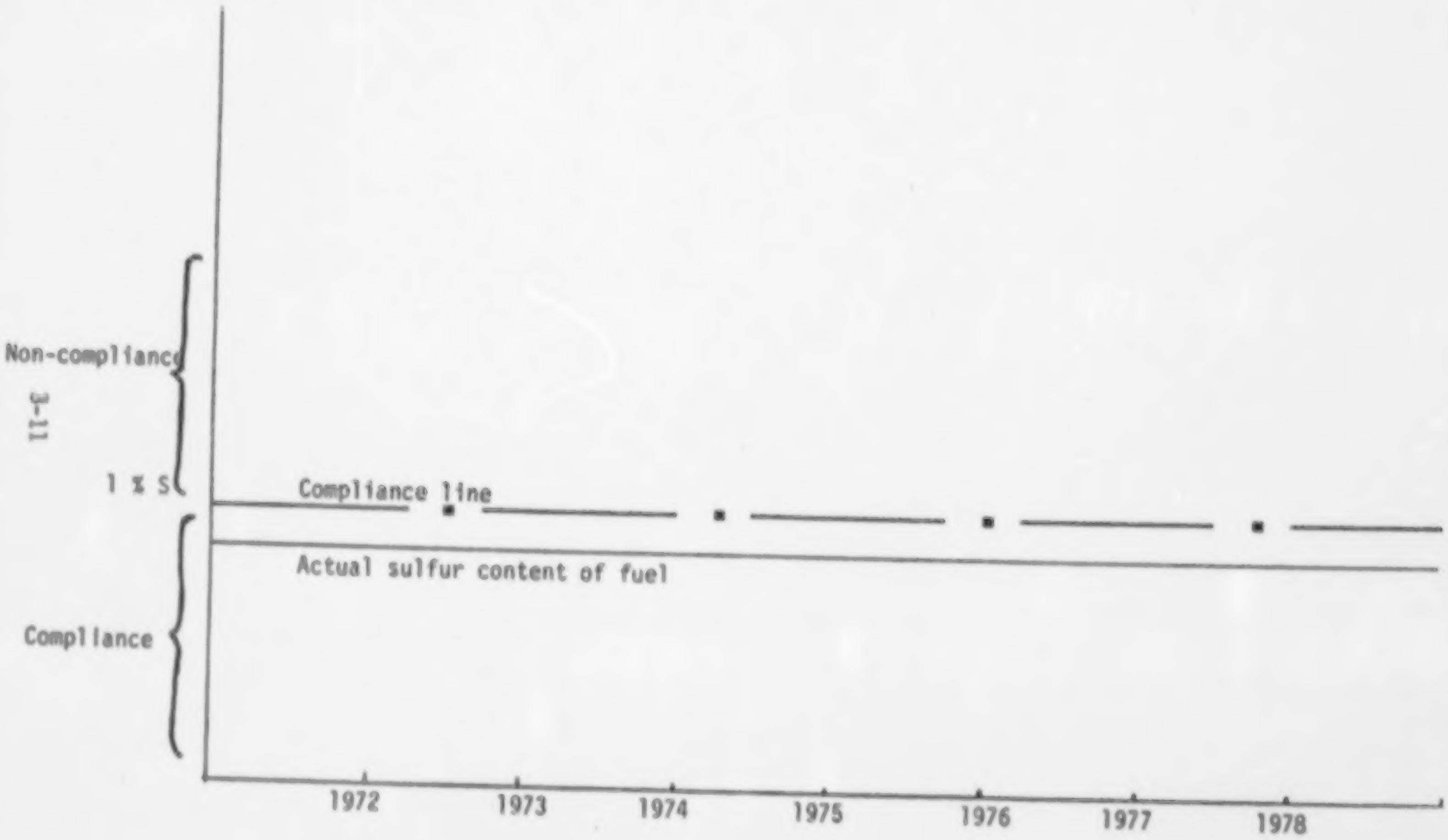


Figure 3-3. SULFUR DIOXIDE EMISSIONS PROFILE
Facility Number 2
Steam Generation

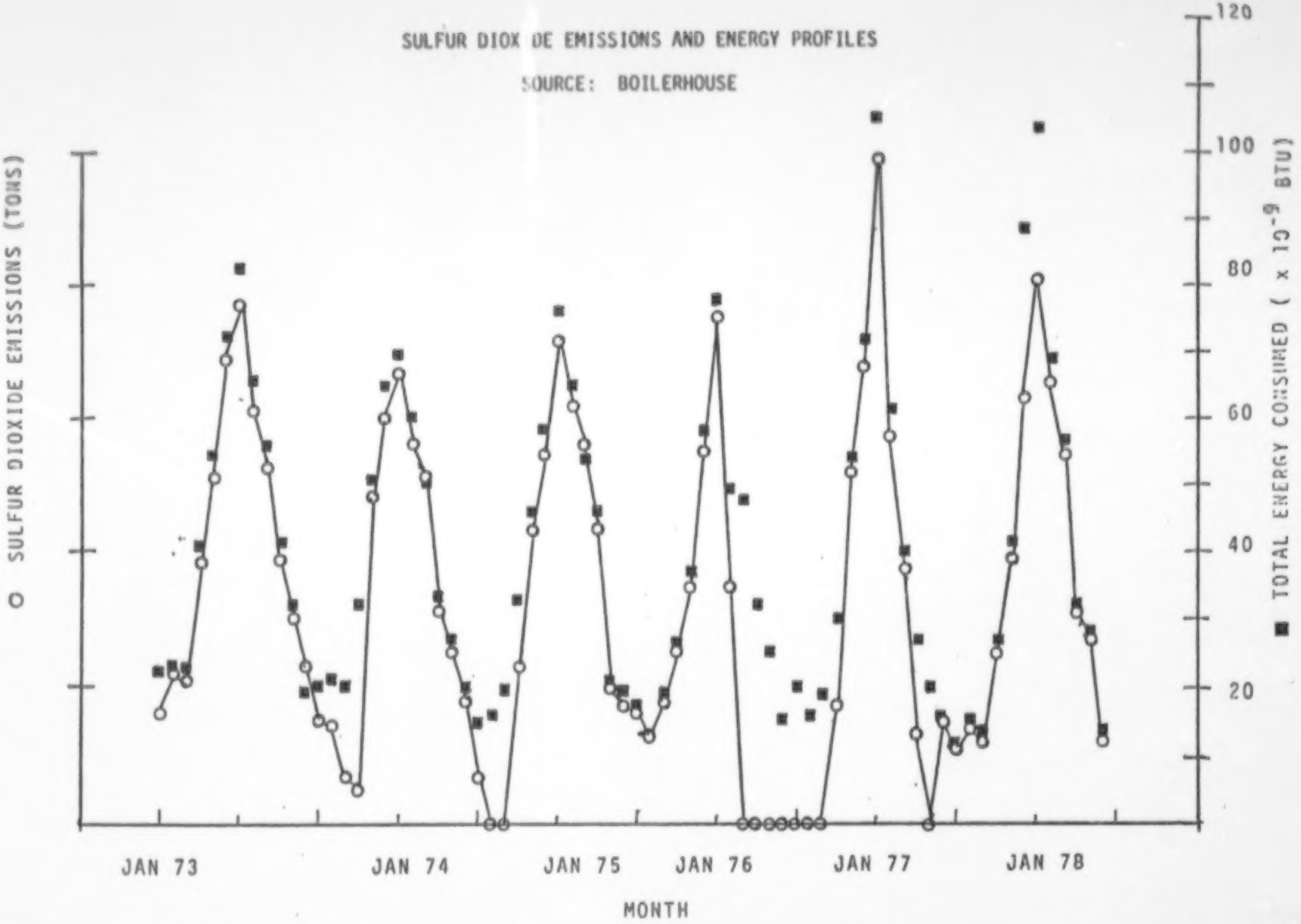

SULFUR DIOX DE EMISSIONS AND ENERGY PROFILES
SOURCE: BOILERHOUSE
○ SULFUR DIOXIDE EMISSIONS (TONS)
■ TOTAL ENERGY CONSUMED (x 10^{-9} BTU)
120
100
80
60
40
20
JAN 73
JAN 74
JAN 75
JAN 76
JAN 77
JAN 78
MONTH

Figure 3-4.

SECTION 3.3

PETROLEUM PRODUCTS

3.3 SOURCE CATEGORY: PETROLEUM PRODUCTS AND HANDLING

3.3.1 FACILITY NO. 1

3.3.1.1 Facility Description

This is a petroleum storage facility consisting of 32 fixed-coned roof tanks on 15.5 acres of land. Fuel oils No. 6 (residual oil) and No. 2 (distillate oil) are the principal products. The fuel oil which is primarily used as a boiler fuel is trucked to customers in the Chicago area. The main activities in this facility are loading, unloading, and storage. During winter, the contents of the tanks (mostly residual oils) are kept fluid by means of heating coils, with the process steam supplied by the boilers. At present, seven oil-fired boilers (four high pressure and three low pressure) are operating at the facility, which are to be replaced by a single high pressure boiler (50,000 pounds/hr at 150 psia and 5 million BTU/hr capacity) with two of the existing high pressure boilers being maintained as standbys. The facility employs 13 people and is on 24 hr/day, 6 days/week operating schedule. Peak hour loading operations occur early in the morning (6 a.m.) with 12 trucks/hr maximum (8 trucks/hr average) and 2 trucks/hr daily average on an annual basis.

3.3.1.2 Key Operations and Pollution Control Equipment

The petroleum products are usually delivered by barge. Occasionally, the product is received by pipeline via a temporary 30 foot hose connection. The storage tanks are bottom loaded. The loading of account trucks is done by splash filling except those transporting No. 2 fuel oil which are submerge-filled. No control devices are installed on the storage tanks or the boilerhouse, as the source believes there is no necessity for such equipment; although at one time several years ago, CDEC suggested the facility install control equipment. This matter was not pursued further by CDEC. The only control device the facility has is submerged-fill system used when loading light (distillate) oil into the tank trucks and loading fuel oil from barges. (See Table 3-1 for throughput data).

3.3.1.4 Decision Making

The equipment necessary to bottom load the storage tanks and submerge-fill distillate oil into account trucks was not installed in response to environmental regulations. Likewise, the installation of a new boiler to replace the existing one was based upon non-environmentally related factors. The existing oil-fired boilers are found to be operating in compliance; however, they generate significant amounts of particulates of SO_2.

3.3.1.5 Performance and Problems

No particular problems were encountered with this facility, except when the soot blowing operation is carried out for a brief period. No control devices are installed either on the storage tanks or the boiler house.

3.3.1.6 Chronology of Permits and Exceedances

Routine annual visits by CDEC occur for re-issuance of their operating permit. Sporadic (twice a year) visits are done by a city inspector to check on the sulfur content of the fuel oil. This consists of performing sampling of the product from the loading rack from which the oil is discharged to the tank trucks. The source indicated that the sampling procedures adopted by CDEC are not adequate in that the withdrawn samples are not representative of the entire bulk volume. This is true, especially in the case of residual oil, where stratification may be occurring due to density/viscosity changes (with temperature). The CDEC checks sulfur content in the fuel oils which are designated for delivery to Chicago-based facilities. This procedure assures all oil sold to Chicago facilities conforms to the CDEC's one percent sulfur regulations.

Table 3-1. THRU-PUT DATA
(Gallons)

YEAR	KEROSENE	DISTILLATES	HEAVY OIL
1971	No breakdown record available.		189,500,000 (all products)
1972	No record available.		
1973	926,000	20,750,000	104,000,000
1974	257,000	36,200,000	77,500,000
1975	170,000	3,000,000	21,500,000
1976	10,000	3,000,000	24,500,000
1977	400,000	7,500,000	16,000,000
1978 (thru Sept.)	841,000	22,000,000	98,500,000

Source: Facility Records

This facility did not encounter any particular difficulty with agencies in obtaining an operating permit or construction permit (for the new boiler). A ticket was issued by a CDEC roving inspector for low pressure boiler startup due to a smoke violation; this case, however, was dismissed later without any penalty. In another instance, a smoke violation ticket (boiler operation) was issued by mistake even though no boilers were operating at that time. The facility complained that the CDEC inspectors were not technically qualified and they made hasty decisions.

Recently, when approached for a permit to construct a 30-foot stack for the new high pressure boiler, the CDEC recommended that a 125-foot stack be installed instead. The source agreed to comply.

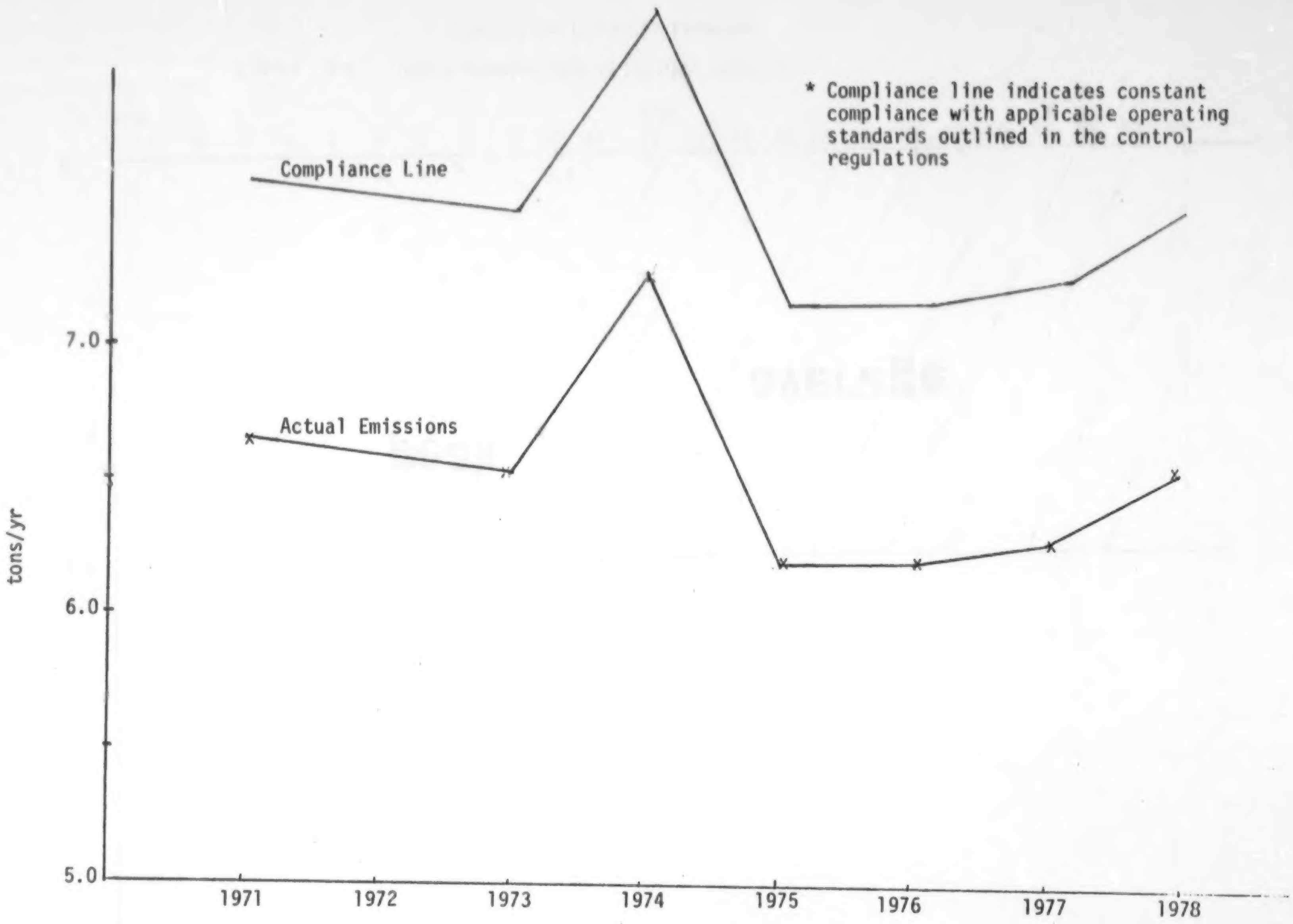
The source's interactions with IEPA have been without incident. The boilers were first permitted in March 1973 and renewed in August 1977. The storage tanks were not originally permitted. However, when IEPA informed the source that permits were needed in 1975, the source responded by making application and permits were subsequently granted.

3.3.1.7 Emissions Profile

The boiler units are found to be in compliance with respect to SO_2 and particulate emissions as calculated in 1977 based upon a fuel sulfur content of 0.92 percent. The annual hydrocarbon emissions profile due to storage/loading/unloading operations are presented in Figure 3-5. Similar emissions on a daily basis are indicated in Figure 3-6. It must be noted that the daily emisions include both breathing and transfer losses, with the latter being at its maximum during 6:00 a.m. and 10:00 a.m. Figure 3.7 illustrates the continuous in-compliance status of the sulfur content in the fuel oil which is scheduled to be delivered to Chicago based customers.

3.3.1.8 Conclusions

Hydrocarbon emissions from petroleum storage and transfer activities are not high, especially since the major product is residual fuel oil. Regular CDEC inspections assure the sulfur content of the fuel oil to be less than one percent for oil scheduled for delivery to Chicago-based facilities. Most of the interaction with the regulatory agencies has been related to administrative functions.



* Compliance line indicates constant compliance with applicable operating standards outlined in the control regulations

Figure 3-5. ANNUAL HYDROCARBON EMISSIONS PROFILE

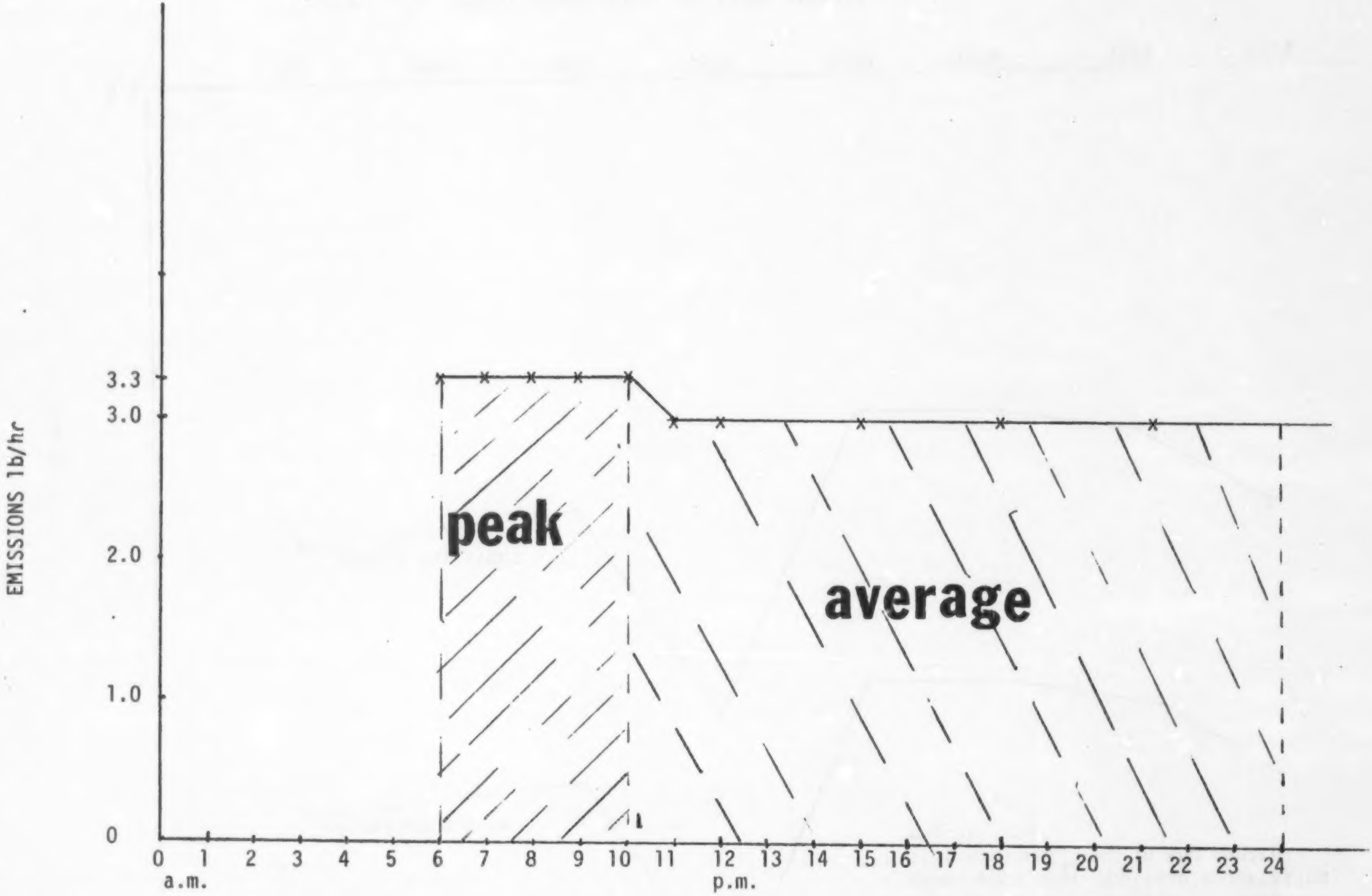


Figure 3-6. DAILY HYDROCARBON EMISSIONS PROFILE
(Petroleum Products Loading)

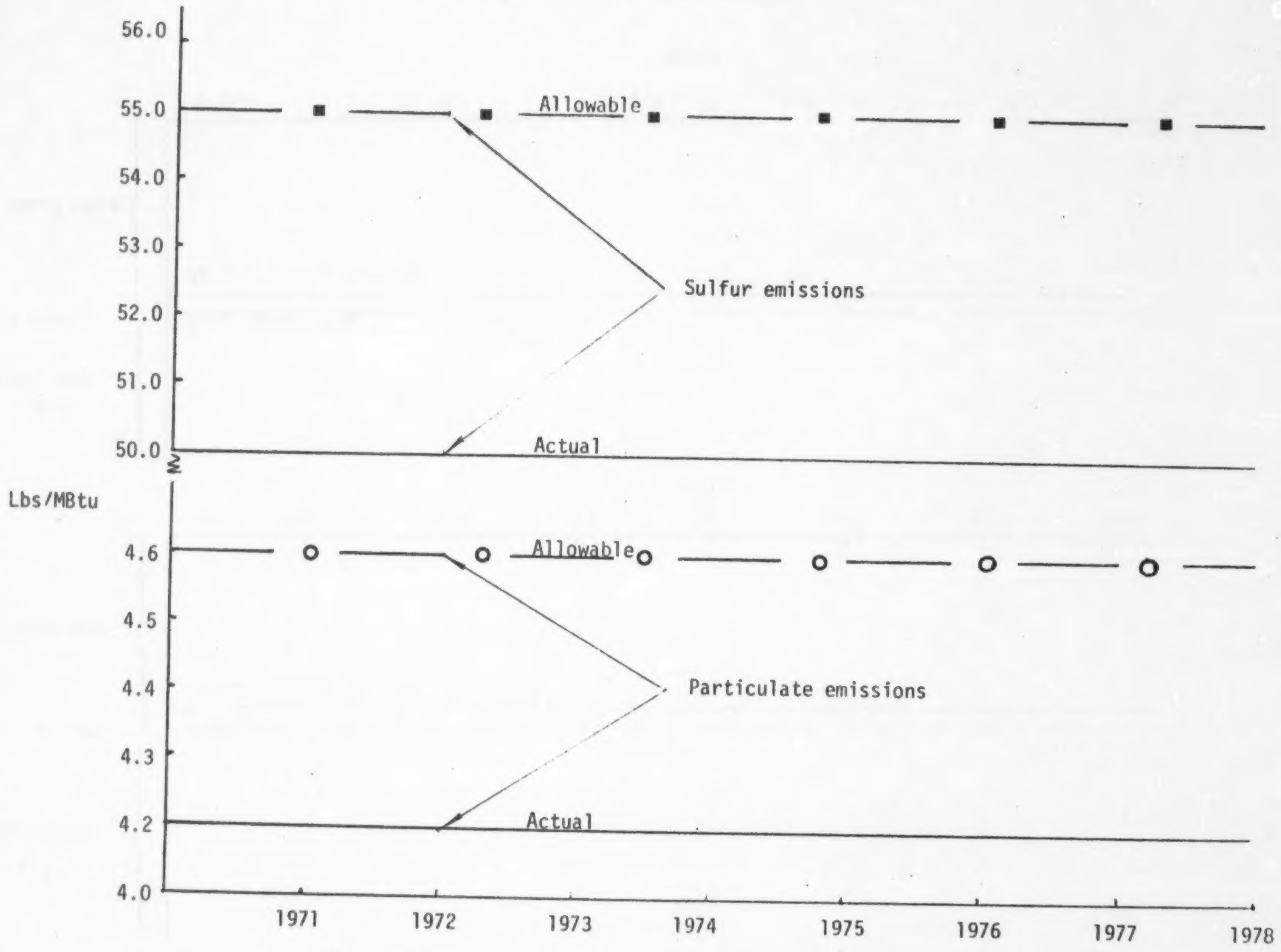


Figure 3-7. ANNUAL BOILER EMISSION PROFILE

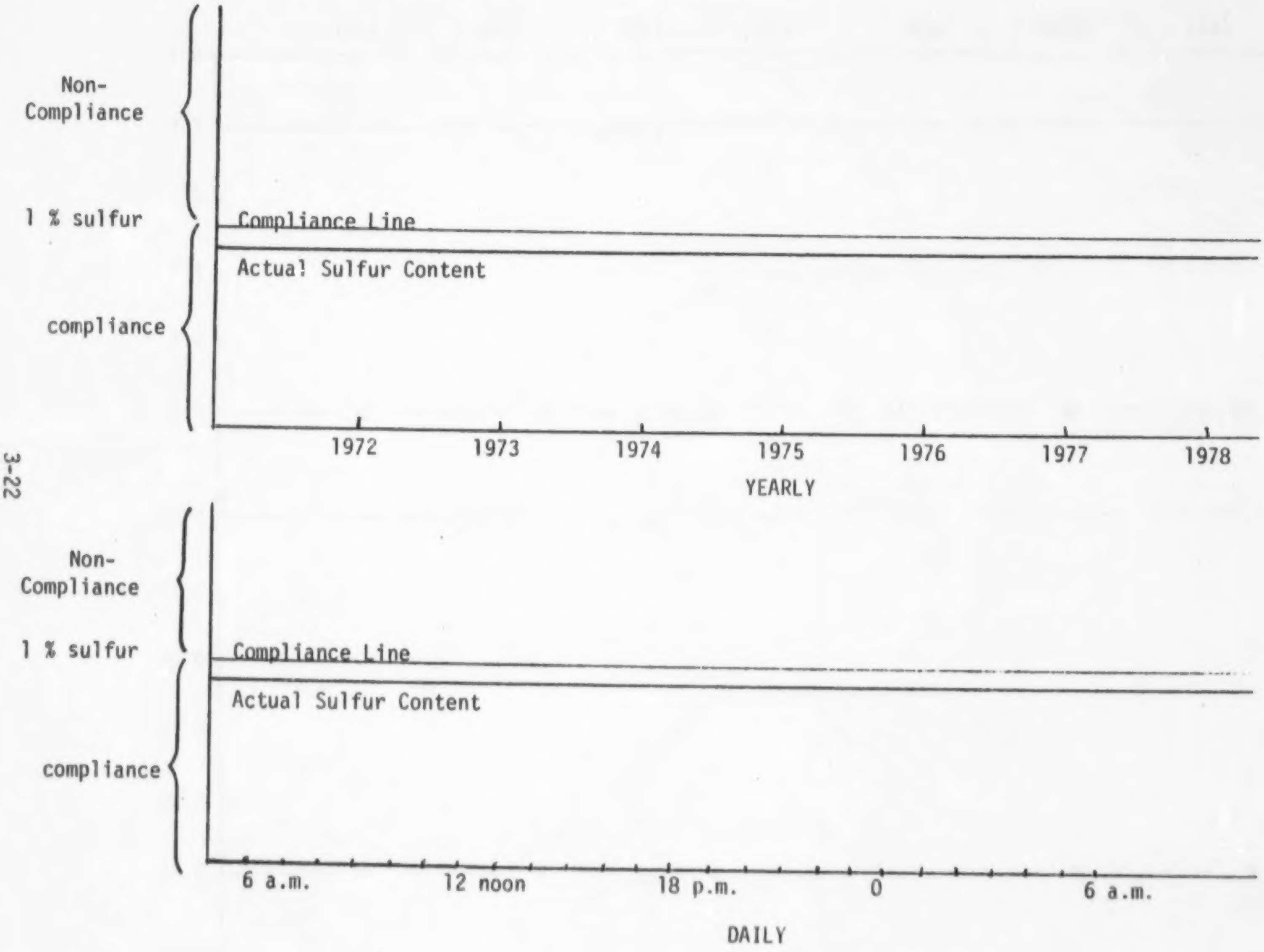


Figure 3-8. SULFUR EMISSION PROFILE

SECTION 3.4
PRINTING AND PUBLISHING

3.4 SOURCE CATEGORY: PRINTING AND PUBLISHING

3.4.1 FACILITY NUMBER 1

3.4.1.1 Facility Description

This is an offset printing company primarily involved in the printing of weekly publications. Because of the nature of its business, (i.e., color printing on coated paper) this type of operation necessitates the use of inks with high solvent concentration which is the major source of hydrocarbons and particulates. The facility, which is located on three acres of land, and operates 24 hours a day, seven days a week and employs about 550 people.

Two types of presses are employed, six web presses primarily used for magazine printing, and 12 sheet-fed presses for miscellaneous printing such as book covers, playing cards, calendars, and greeting cards.

3.4.1.2 Key Operations and Pollution Control Equipment

Approximately 13 to 15 billion pounds of paper is processed (printed) every year with a corresponding ink consumption of 700,000 pounds per year. The average solvent content of inks used in the six web presses is 35 percent, and that used in the twelve sheet-fed presses is 15 percent (in 1972). In the web press, rolled paper is fed into the press on webs and printed on both sides of the paper, dried, folded and cut in one continuous operation. Each web press is equipped with a drier; four of the driers are gas fired and the remaining two operate on electricity. Of the total six web presses, two are old and have a limited capacity; two are modern and high speed (900-1400 ft/min paper speed) presses. The majority (approximately 65 percent) of the ink is consumed by the web presses.

The sheet-fed presses run at a much slower speed than the web presses and print on one side of the paper only. All the printed material is air dried. There are no control devices on the sheet fed presses (none are required since low emissions occur). In this facility the major source of interest is the web press (from a pollution point of view) and hence it will be dealt with in detail.

According to Illinois regulations. organic solvents emissions are based upon the entire facility rather than on a single point source. The major pollutants associated with web presses are volatile organic compounds, vaprozied resins, and smoke (visible emissions). Most of the emissions occur during the drying operation of the printed material. Some fugitive emission do occur during the printing process itself near the presses.

Emissions from the two old web presses are controlled by an afterburner which was found to be operating on an intermittant basis; two other web presses which are equipped with electric driers have no control devices. The two remaining web presses are controlled by individual ESPs (electrostatic precipitators). These ESP's have a design removal efficiency of 90 percent. Initially, one of the web presses was fitted with a filter system. However, this simple filtration system was found to be totally ineffective as it did not alleviate the visible emissions problem.

3.4.1.3 Financial Impact

The passive filter system installed on one of the web presses, intended to eliminate visible emissions and particulate emissions problems, cost the facility approximately $56,900 to $91,000. Subsequent to its failure, the facility purchased and installed a $45,483 electrostatic precipitator. The source anticipates installation of two more ESPs by 1980 (one in mid 1979, and another in 1980). Because of the operation problems, resulting from cold winter weather and installation errors, the facility will be forced to spend another $20,000 towards the costs of insulation and construction of an enclosure on the roof to correct the problem. The facility also hired a stack testing company in 1977 (cost unknown) to evaluate the emissions from the pressed fitted with ESP. Additionally, the facility was subject to enforcement penalties on a few occasions by CDEC.

3.4.1.4 Decision Making

In response to IEPA's mandate in 1973 for control equipment to abate smoke problems, the facility initiated its course of action by installing an experimental passive filtering system. The facility claims that at that time no proven methods/techniques were available for effective control of emissions, a decision was made to convert to a two stage ESP in 1976. Drawing on experience gained from the first installation, an improved ESP became operational on the second press in 1978. Two more ESP's are on order and will be installed on the remaining two presses. It is the opinion of the source that afterburners are more effective in controlling both particulate and hydrocarbon emissions (IEPA corroborated this opinion), but are very expensive to operate and subject to gas curtailments in periods of shortage. However, since IEPA is primarily interested in the alleviation of the particulate emissions problem, the source chose the less expensive control equipment (ESPs). Also as part of the compliance program, the inks used in this business required reformulation resulting in low pollution offset inks (Rule 66 VOC emissions). The facility has complied with this requirement.

3.4.1.5 Interaction with Regulatory Bodies

The first known contact by IEPA with the subject facility was made at the end of 1972, when the facility was informed that the printing and publishing industry is required to submit permit applications by December 1972. At that time the facility was operating in violation of particulate emisssion limitations. According to IEPA the facility failed to submit a definite and effective compliance schedule; the company's efforts towards compliance have been poor. Also it did not obtain construction permits for pollution control devices or an operating permit for a new press. The company did not act in good faith to effectively reduce pollutant emissions, but instead chose to implement delaying tactics and experiment with unproven control methods. Several notices of violation were isued by both CDEC and IEPA on numerous occasions (since 1972) for smoke/particulate emissions exceedance. Also no construction or operative permits were obtained on a newly installed press or its control equipment prior to installation. The facility also failed to obtain construction/operative permits for the afterburner. In reply to this, the facility contended that the afterburners were installed between 1967 and 1969 when no permits were required. Additionally, IEPA expressed the concern that the CDEC was lenient in its enforcement action on this facility contradicting this. The source indicated that IEPA has imposed stricter time schedules and was generally less helpful in suggesting effective control devices. The initial operating permits for all emission sources were issued to the facility in 1973. Subsequently, operating permits/renewals were denied on several occasions because of non-compliance and inadequate control programs.

3.4.1.6 Performance and Problems

The facility has experienced many problems since the time it was notified by IEPA (late 1972) that the facility is required to control emissions, or utilize effective pollution control devices. The utilization of control techniques whose performance was uncertain of printing operations and design inadequacies of ESPs led to many operational problems resulting in compliance delays. The control equipment had to be shut down at times because of the problems/modifications. The passive filter installed on one of the web presses did not effectively control visible emissions and some modifications were tried to improve the performance of this unit but to no avail. A two-stage electrostatic precipitator was installed on one of the presses. Again, operational problems developed because of improper temperature reduction (insufficient cooling) and water pump malfunctions. Hence, modifications were required on the ESPs. The source believes that these problems have been overcome and has committed to the installation of two additional ESPs for the web presses.

3.4.1.7 Chronology of Permits and Exceedances

The IEPA, after conducting an investigation of the facility in November 1972, warned that it was emitting excessive particulates (particulates were the primary interest of the State). However, operating permits (containing a compliance program) were issued for all emission sources in April 1973. As a part of this program, conversion to exempt solvents was affected in mid 1974. There were at least two instances of citizen complaints in 1974-1975. Additionally, notices of opacity violations were issued on several occasions. The facility has been operating a new press/ESP without prior application or receipt of construction and operating permits. The first interaction of the CDEC with the facility occurred in 1974 when the CDEC requested emission data. In August 1975, the city issued a permit to install a warning concerning opacity/hydrocarbon exceedances. The experimental filter system proved ineffective and was replaced with a two-stage ESP in August 1976. The ESP did not effectively control emissions and required modifications. Also it was found that the afterburners installed on the two old presses were not operating on a continuous basis. After several Appeal Board hearings in 1977, the CDEC agreed to allow an additional year to bring the facility into compliance, on the condition that monthly progress reports would be submitted to the agency by the facility.

3.4.1.8 Emission Profile

The particulate and hydrocarbon emission profiles on an annual and daily basis are presented in Figures 3-9 and 3-10. The facility is operating the presses in violation of particulate and opacity regulations.

3.4.1.9 Conclusions

This source is a typical situation where a timely and effective compliance program could not be achieved. The facility has been operating in violation of opacity/particulate emissions standards. Insufficient enforcement and lack of direction were the primary factors leading to an ineffective control program. Finally, the facility has realized its responsibilities and is taking serious steps to implement emissions reductions.

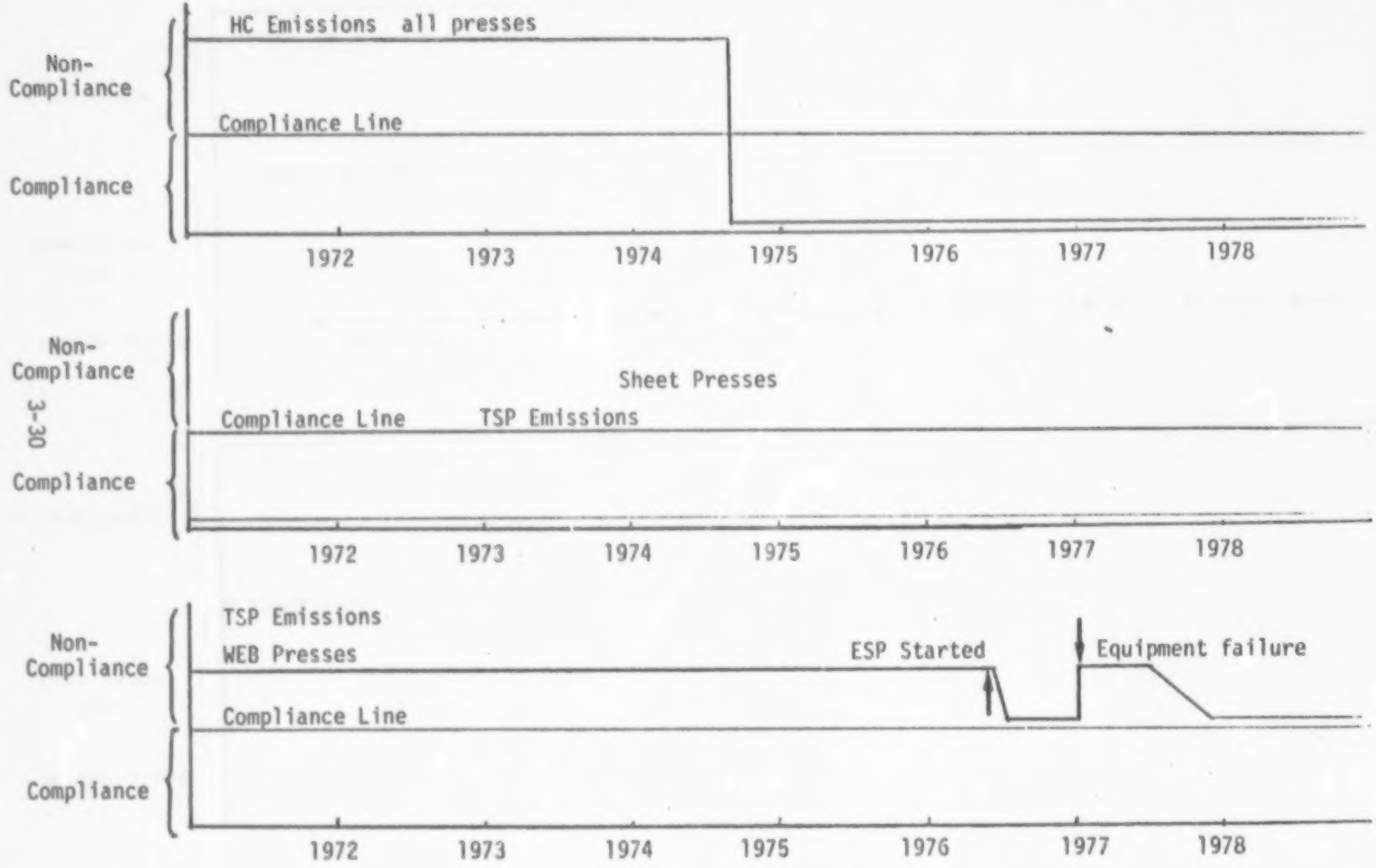


Figure 3-9. EMISSION PROFILE - ANNUAL

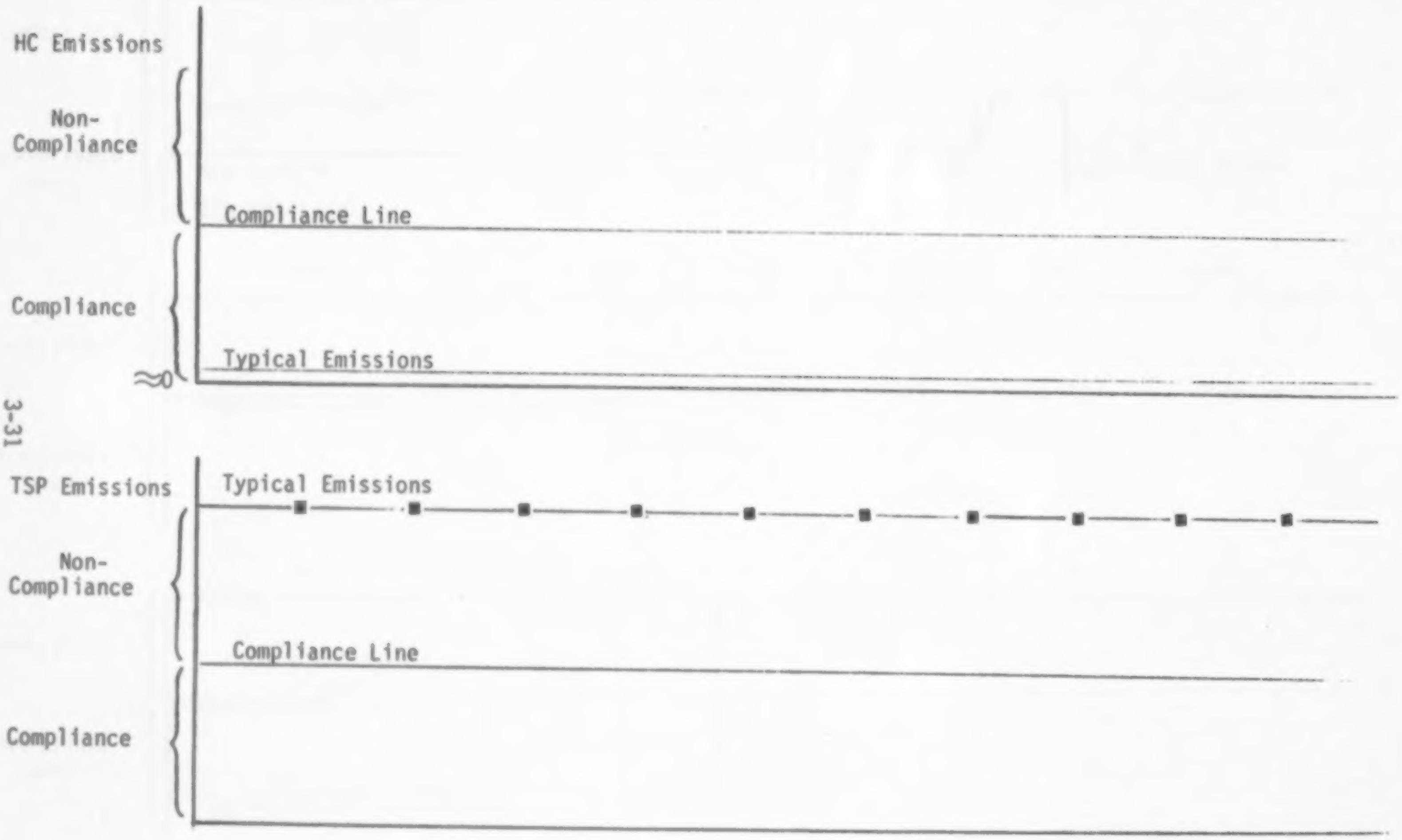


Figure 3-10. TYPICAL DAY EMISSION PROFILES

SECTION 3.5

SECONDARY ALUMINUM

3.5 SOURCE CATEGORY: SECONDARY ALUMINUM SMELTING

3.5.1 FACILITY NO. 1

3.5.1.1 Facility Description

This facility is a family-owned non-ferrous metal processing plant located in an industrial sector in Chicago. The operation moved into an already existing building in 1969, with the majority of the process equipment being installed in that year. The plant representative noted that no process changes have been made since that time. Additional equipment has, however, been put on line to accommodate increased production demand.

The source is primarily engaged in the production of aluminum ingots for die-case and foundry operations. Machined and balded scrap (and large aluminum sows) are processed and, subsequently, refined to produce these end products.

Balded scrap comes into the facility in 600 lb bales which are broken apart and sorted in a sorting area by hand (clean vs. dirty scrap). The scrap is then introduced to a magnetic separator to eliminate ferrous materials. Machined scrap is preprocessed in a boring drier which drives off cutting oils and greases. Aluminum clad iron is processed in a sweat furnace so as to recover additional aluminum.

An IPCB opinion and order from 1971 noted that approximately 1,000,000 pounds of aluminum scrap is processed by the facility per month. Zinc is also processed, but to a much lesser degree.

The plant utilizes some 40,000 squre feet of floor space and presently employs approximately 60 people. The main shift handles most of the work with skelton crews maintaining smelting operations through the other two shifts (i.e., furnaces).

3.5.1.2 Key Operations and Pollution Control Equipment

In its smelting operation, the company uses two reverberatory furnaces, one sweat furnace, three melting pots for zinc, and a boring drier. The two reverb furnaces are very near equal in capacity (approximately 80,000 lb). They are used to melt and refine "clean" aluminum scrap (individual process weight rate vary from 2,000 to 2,775 lb/hr). In addition to small percentages of silicon and copper metals, varying quantities of aluminum chloride, potassium, aluminum flouride, and magnesium chloride are added as fluxing agents to the aluminum charges. Charging and fluxing are done in charging wells which preceed the refining zone of the furnace.

The sweat furnace is used to separate aluminum from scrap which has been combined with higher melting point metals such as iron. There are two such furnaces at the locations; however, only one is in use. Both have identical process weight rates of 1,500 lb/hr. Molten aluminum recovered in this fashion is directly cast in molds to form ingots.

The three zinc pots are used to melt high grade zinc (500 lb sows) and aluminum to produce an alloy metal. A lead melting post, which has been inactive for some time now, was utilized to melt scrap lead for ingot formation. All three furnaces are said to have 2,000 lb/hr weight rates and capacities of approximately 10,000 lb. The boring drier processes approximately 1,000 lb of material per hour, and is operated a total of 24 hrs/wk.

The two reverb furnaces are set up to fire on both oil and natural gas as are the sweat furnaces. Reverb furnaces are operated 24 hrs/day, 6 days/week. The sweat furnaces are estimated to produce some 8,000 lb of aluminum in an eight hour working day with a maximum process weight rate of 1,500 lb/hr.

The chief pollutant associated with these metallurgical processes is particulate emitted in the form of metal oxides. The reverb and sweat furnaces represent the major sources of particulate emissions, smoke, and fumes being operated in the charging well zone during scrap charging and fluxing operations (chlorides and flourides are also released) in the reverb furnaces and during charging in the sweat furnaces. Calculations based on AP-42 emission factors indicated that the sweat furnaces generate greater amounts of particulates than do the reverb furnaces. Visible emissions were also associated with this facility prior to the installation of a very effective control system.

Exhaust gases from the two reverb furnaces and single sweat furnace are now controlled by an induced draft baghouse system which utilizes gas precooling prior to the actual gas cleaning process. The 37,000 ACFM system consists of three major components. A quench section, fitted with low pressure air dispersion spray nozzles, effectively lowers gas temperature by injecting water at a maximum rate of 13.1 gpm. This duct area is then followed by an evaporator vessel and, finally, the four-module baghouse. The dacron bags used in this baghouse are coated with a proprietary compound which, according to the manufacturer, selectively absorbs gaseous emissions (i.e., acid gases), assists in the capture of submicron particles, and prevents blending and/or burning of the bags. Bag cleaning is performed by mechanical shakers which are activated automatically by a pressure differential sensor/transducer. The baghouse catch, which consists primarily of thermally stable inert power (salts), are removed at scheduled intervals via a disposal cart. The catch is disposed of in a public dump.

Performance is constantly monitored by automatic sensors (i.e., pressure transducers) as well as by personnel, who can monitor all of the system operating parameters by viewing the extensive system control panel.

The rotary dryer is vented to a 1×10^6 BTU/hr afterburner which operates at 1,200°F. Boring dryer emissions consist almost entirely of volatized organics. The other sweat furnace, not in use for some time, is also tied into this afterburner. Provisions have been made in the ducting for tie in of the second sweat furnace and third reverb in the event of increased production demand.

3.5.1.3 Financial Impact

The costs incurred for the control of pollutant emitting sources within this facility have, to say the least, been substantial. According to the company spokesman, capital expenditures for the design and installations of the plant's 37,000 ACFM baghouse system approached $500,000 ($658,000). This figure compares significantly with the $600,000 ($925,000) initial investment which was required to fit the plant with its inventory of processing equipment back on 1969. Although fines have been imposed upon the facility for violations, their impact has been minimal in comparison to 5.5 million annual sales realized in fiscal year 1973 (this dollar value was excerpted from an IPCB Opinion and Order dated June 1973).

Although exact cost data was not available, dollar figures were obtained for some of the subcontracts. Around mid-August of 1974 the company entered into a contract with their consultant for the erection of a baghouse system. The quoted cost for the baghouse and associated system components appears to have totaled $200,000 ($263,000) at date of signing.

Many additional costs were, however, connected with this project. By November 1974 the company had reportedly spent some $26,000 ($34,000) on engineering fees. In March of 1975 the spokesman informed CDEC that almost $100,000 ($132,000) in "engineering and other costs" had been paid out. The single most costly contingent contract was let for installation of ductwork, quoted at $79,000 ($94,000) in August of 1975. Furnace hooding was estimated at $10,000 ($11,000) for fabrication and installation (June 1976). Other costs included plumbing, electrical wiring, and hooding modifications to one of two sweat furnaces. Before the IEPA would grant a permit, tie-in ductwork and hooding was also required for the sweat furnace, thereby incurring additional cost.

The fines imposed by the State of Illinois totaled $2,250. A fine of $750 ($840) was required for the permit violation to be paid to the State by November of 1975. A $1,500 ($1,700) penalty was imposed by the IPCB as a result of the decision ruled in the "People of Illinois Case" (paid January 1976). This later fine was levied as a penalty for emitting emissions in excess of the allowable level for the plant. The Opinion and Order requiring this payment noted that "the engineering design and construction of the system will cost $400,000." Cost for legal council, etc. were not available.

In an effort to assuage the impact of the expense of implementing their control strategy, the company sought and was granted permission to sell bonds by the state financing authority (March 1975). This endeavor was nonproductive, however. The company president stated that they could not sell bonds as expected because no one was interested in them. He commented that the big corporations do not, as a rule, purchase such bonds from smaller concerns.

3.5.1.4 Decision Making

At the outset of their interaction with the agency, the facility was of the opinion that they were not, and therefore should not be considered, a pollution emitting source. The facility persisted with this point of view throughout the first round of negotiations and hearings, never vacating this standpoint. The IEPA and the facility communicated a number of times through written correspondence before the IEPA filed an enforcement action. The IPCB ruled in favor of the IEPA, declaring that permit denials were justified.

In response the facility took a new approach, asserting that all the emissions emanating from their various uncontrolled smelting/refining operations were, in effect, being treated since the building acted as a "giant settling chamber". At the demise of this rather farfetched theory (disproved through contrary testimony by experts) and upon realization that civil actions would continue to be taken against them, the facility management stated that the IEPA took an enforcement approach to their problem, interacting only on legal issues rather than advising them of tangible remedies. To the contrary, he was well impressed with CDEC's more "realistic" approach to the situation, commending them for their understanding and assistance. To quote the representative, "CDEC personnel nursed us through that rough period."

3.5.1.5 Performance and Problems

The company representative informed investigators that the control equipment has performed without fail since its startup and debugging in mid-1977. As he stated, "we have installed equipment which exceeds control requirements." This statement was verified by stack tests performed by the CDEC in the months of August and September 1977.

Delays in the installation of the system were prevalent throughout the different stages of development. A three month postponement was experienced as a result of problems encountered in obtaining a guarantee from the contractor. Other delays involved belated equipment deliveries, design changes, complications in contract negotiations between subcontractor and the major contractor, and extreme weather conditions (winter).

3.5.1.6 Chronology of Permits and Exceedances

In researching the state and local source files on this facility, it was found that both agencies have had extensive interaction with this facility both of a formal and informal nature. The source has been engaged in ongoing litigation with the enforcement branch of the

IEPA for the entirety of the case study period. A brief overview of the legal events relating to their case is as follows.

As a result of an investigation performed by IEPA regional inspector in December of 1971, an enforcement action was filed with the IPCB in January of 1972, contending that the facility was in violation of several state air pollution control regulations. Cited were the source's failure to obtain construction permits for two zinc pots which were soon to go on line, failure to secure an operating permit for an already existing control device (the afterburner), and the violation of state air pollution emission standard for particulates (uncontrolled emission sources).

In June of 1973 the IPCB issued an Opinion and Order which adjudged the source guilty of causing air pollution, violating permit requirements, and allowing excess emisions. A fine of $2,500 was imposed as a consequence. The facility appealed the Board Order in Illinois Appellate Court. The Court vacated the Board Order and penalty of $2,500 and the cause was remanded to the Board to consider the penalty, if any, which should be imposed for violation of the permit requirements. The Board declared, in a September 1975 Opinion and Order, that a fine of $750 would be appropriate for the permit violation.

As a result of the Appellate Court decision, the agency appealed to the State Supreme Court to uphold the Pollution Control Board decision. The Supreme Court refused to hear the Agency's appeal; hence, the Appellate Court decision was upheld.

Facility representatives have appeared before the IPCB in answer to other compalints filed by the IEPA as well as countercomplaints filed on their own behalf by their attorney. These dealings concerned themselves mainly with the matter of denials to grant operating permits for process equipment and the related charges of discharging emissions in excess of those allowed by state emission standards. The IEPA repeatedly denied the facility operating permits for the reverb and sweat furnaces (1/73, 2/73, 5/73, 5/75, 10/77) due to numerous mitigating factors. The earlier denials were based on the source's failure to submit evidence showing that the construction or modifications made would not cause a violation of the Illinois Environmental Protection Act. (The first notice of denial concerned only the sweat furnace; an amending letter cited additional sources which could not be permitted for the same reasons.)

In April of 1973, the facility resubmitted applications for the process equipment, contending that all said emission sources were adequately being controlled via natural settling within the building due to the size and geometry of the structure (a permit application was filed claiming the building as a control device). Stack tests were performed by the CDEC to disprove this contention (tests were performed to determine the emission level of effluents exhausted by the roof mounted circulation fans). The rest results were indecisive but subsequent IPCB hearings resulted in decisions confirming the IEPA's contentions.

As a result of negotiations for a voluntary compliance program, the facility agreed to install a baghouse within a year and filed a petition for variance with the IEPA to operate their plant while under the compliance timetable. Similarly, the source requested a Period of Grace from the city for the same. Hearings were held before the IPCB in the interest of evaluating these petitions.

An Interim Order of the Board denied one such petition (filed May 1978) due to the source's failure to provide adequate information concerning the impact continued operation would have on the National Ambient Air Quality Standards. An amended petition was required of the facility. The second petition was also denied, the matter being "dismissed without prejudice" due to a pending case filed by the Attorney General on behalf of the People of Illinois (IPCB hearing; May 1975). The "People of Illinois" case was decided in favor of the Complainant in January of 1976 with a fine of $1,500 being imposed as a result.

As mentioned previously, CDEC interaction with the facility was also very comprehensive. In fact, a file review indicated at least 14 hearings were held before the CDEC Appeals Board in the period between May 1974 and July 1977. Most of those hearings were held as a means of reporting progress on the design and construction of a baghouse system which was contracted to be built in August of 1974. The facility was also heard in the cause of acquiring Periods of Grace from CDEC.

A routine annual inspection brought CDEC into the picture around March of 1972. City inspectors detected violating conditions and so denied the source its Certificate to Operate. Frequent interaction was documented to have occurred between facility and CDEC from this time on, with CDEC personnel monitoring development on a weekly basis. The CDEC required a progress report from the facility every six months, with a department official being dispatched to verify them as they were received. The facility spokesman noted that the city conducted inspections on a monthly basis while the source was operating under variance conditions.

3.5.1.7 Emission Profile

The particulate emissions generated by the smelting processes are now effectively controlled by the baghouse system. The annual profile indicates that the source has been operating well within the allowable emission level for particulates since the control equipment came on line in 1977. This profile quantifies emissions controlled by the baghouse system (i.e., the two reverberatory and single sweat furnace). The typical day profile illustrates the drop in actual emissions which occurs when the sweat furnace is taken off line at the end of an eight hour work day. The emissions are based upon EPA AP-42 emission factors and a control efficiency of 99.8 percent.

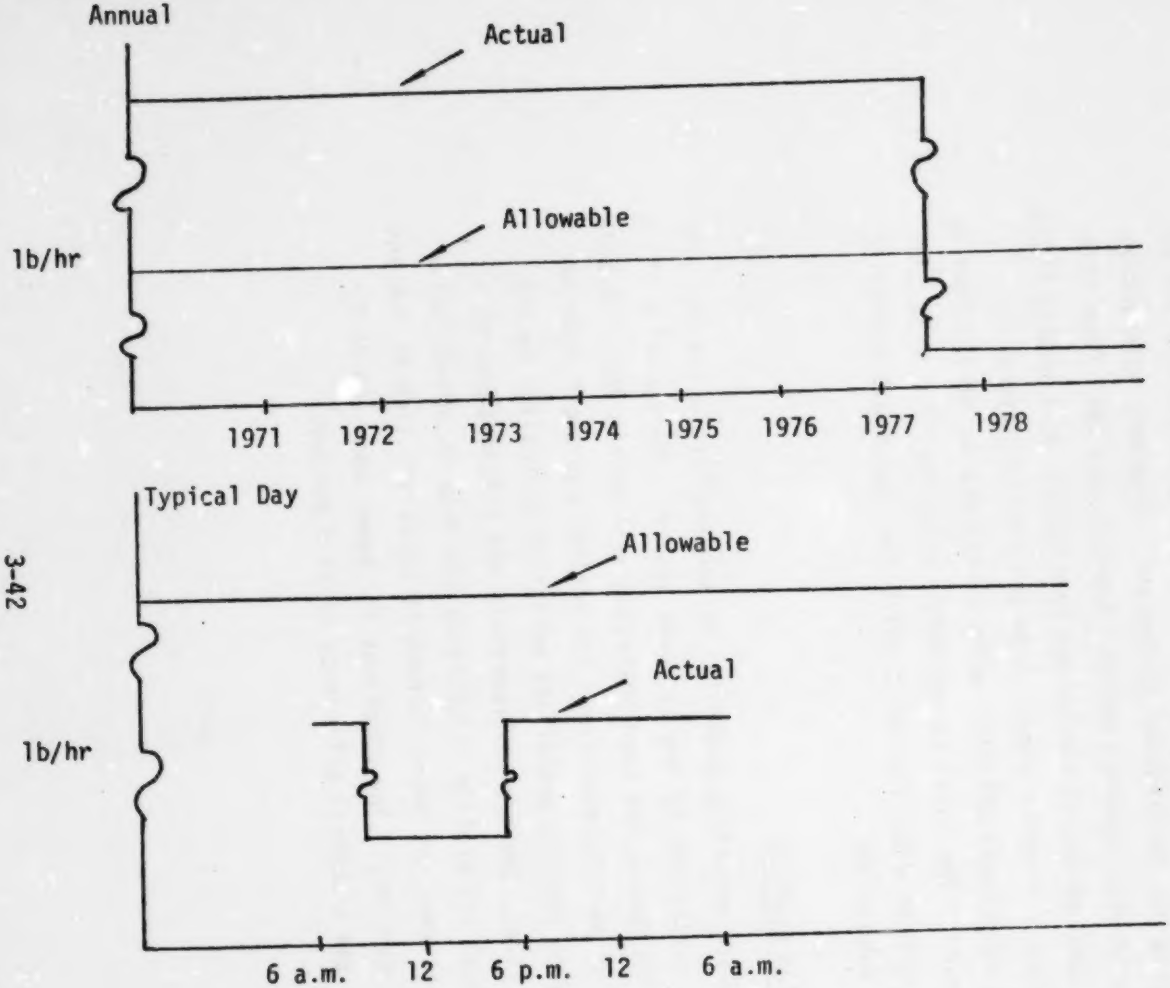


Figure 3-11 TSP EMISSION PROFILE

3.5.1.8 Conclusions

The source is now operating in compliance with all applicable air pollution regulations. Prior to detection of violations, the source had had no intention of controlling emisions since they felt that their processes were being controlled effectively by their unique building arrangement. All emissions were vented to the interior of the building and were exhausted to the atmosphere through roof mounted fans prior to the installation of control equipment.

Actions taken by state and local agencies prompted the facility to enter into an agreement to control emissions.

SECTION 3.6

BRASS AND BRONZE

3.6 SOURCE CATEGORY: BRASS AND BRONZE

3.6.1 FACILITY NUMBER 1

3.6.1.1 Facility Description

The facility produces brass and bronze ingots by smelting and refining scrap from numerous sources. Scrap is sorted and charged over a 12 hour period. Normally, only two of the three furnaces are utilized simultaneously. The plant operates 24 hours/day, 4 to 5 days/week year round. The facility is located on a one and one-half acre site and employs about 30 people.

3.6.1.2 Key Operations and Pollution Control Equipment

The emission sources are three oil-fired smelting furnaces. Sulfur emissions are controlled by utilizing less than one percent No. 5 grade fuel oil. Particulate emissions are controlled by three baghouses. Hooding is such that any furnace can utilize any of the three baghouses. A cooling water spray in the ducting to the baghouses cools gas temperatures to 350°F.

3.6.1.3 Decision Making

The decisions for production and control rest with the plant manager at the facility.

3.6.1.4 Performance and Problems

Problems with the operation of this facility were basically housekeeping in nature. The baghouses were not properly maintained and fugitive fumes are emitted during charging and pouring operations. Additionally, the dross or slag were cooled in an open area resulting in fugitive emissions.

3.6.1.5 Chronology of Permits and Exceedances

The installation of the baghouses was in response to the CDEC action in 1966. Although there were some difficulties in the program (fires in the baghouses), operating permits were granted upon completion in 1971. Except for the annual renewal and inspection there has been minimal interaction with CDEC.

IEPA informed the facility to obtain an operating permit in May 1972. The source responded that they had a CDEC permit. No application was filed. IEPA did recommend enforcement action at that time, but the next interaction was a warning letter in January 1974. The source submitted its applications for permits in July 1974. A site visit in August 1974 indicated that conditions had improved because of upgrading the water spray cooling system. This eliminated the hazard of fires in the baghouse. The operating permits were granted in October 1974. Another site visit by IEPA in August 1976 indicates that compliance had been maintained.

3.6.1.6 Emission Profiles

Although fires in the baghouse were a problem initially, there is no indication that excessive emissions resulted for any lengthy period. This was the result of the flexibility to duct any furnaces to any of the three baghouses.

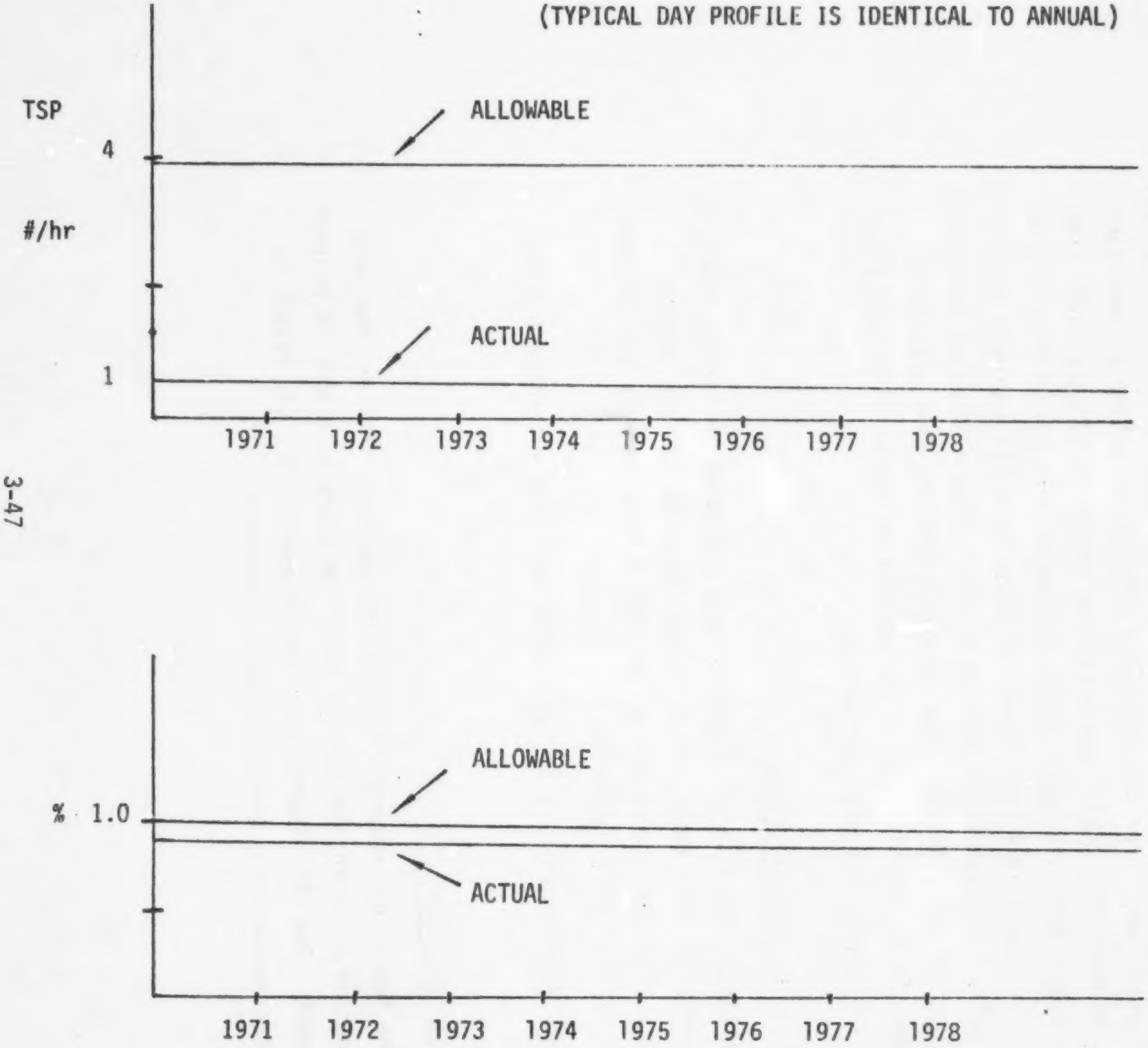
Sulfur emissions are met utilizing less than one percent sulfur fuels.

3.6.1.7 Conclusion

The source did respond to regulatory action. However, the CDEC interaction began in 1966 and it took five years to result in control equipment. The IEPA interaction, though much later, did result in improved housekeeping and maintenance procedures.

Figure 3-12 EMISSION PROFILE

(TYPICAL DAY PROFILE IS IDENTICAL TO ANNUAL)



SECTION 3.7
CHEMICALS

3.7 SOURCE CATEGORY: CHEMICALS

3.7.1 FACILITY NUMBER: 1

3.7.1.1 Facility Description

This facility is a large chemical manufacturer located on a 136 acre plot in a highly industrial section of the city. The plant produces chemicals, coatings, and containers (cans) which are shipped all over the country with the largest proportion going to the midwest area. The coatings are used by homeowners, painting contractors, and industry, while the containers are used by manufacturers of household, automotive, and industrial products. Chemicals are used in inks, color making, insecticides, and antioxidants. Operating schedules depend upon the type of operation, but usually cover seven days/week, 52 weeks/year, and 16 to 24 hours/day. The facility has 1,800 employees, 600 of which are salaried.

This report will cover one process in this facility. Since this process involves a propriety operation, all raw material inputs and process parameters are held to be confidential by the company. This process is unique, since this company is the only domestic producer of this chemical by this particular method.

3.7.1.2 Key Operations and Pollution Control Equipment

Five control devices, including aerators, air condensers, water scrubbers, and sulfur scrubbers have been used by the source since 1961. These devices control odor and organic emission problems. The estimated organic emission efficiency of the system as of 1978 is 80 percent, which does not bring the source into compliance. The source is presently petitioning for a rule change so no additional control equipment will be needed.

3.7.1.3 Financial Impact

Since 1961, the company has invested over $1,794,000 in control equipment. Annual operating costs approach $120,000. No estimate was available for legal costs associated with appearance before the Chicago Appeal Board and the Illinois Pollution Control Board (IPCB). Legal costs are presently being incurred since the source is petitioning the IPCB for a rule change concerning their process. The odor test costs in 1972 were approximately $4,500. The source stated that if the rule is not amended, the facility expects to invest an additional $700,000 in controls. Operating and maintenance costs would increase by $225,000 per year, according to the facility.

3.7.1.4 Decision Making

The original IEPA operating permit was granted for this existing process in 1972. When an application was made for a construction permit to expand output (plans subsequently abandoned) and for renewal of the operating permit it was denied by the IEPA permit section on the basis that this source was a petrochemical manufacturing process and must meet the limitations of a more stringent regulation. The origi- nal permit had been granted under provision of Rule 205 (f), organic material while the new interpretation made the source the subject to Rule 205 (g) (i) (e) for petrochemical manufacturing processes. The permit renewal was denied in March 1975 and was subsequently appealed to the IPCB where the denial was upheld. An appeal was then filed in the Appellate Court, but no action was taken because in discussion with the IEPA, it was decided to petition for a rule change. Hearings on this petition change were held in late 1977 and early 1978. An economic impact was also made to analyze the effects of the proposed rule change. To date, no decision has been published by the IPCB. Throughout this litigation period, the source has continued to operate the process.

The odor problem arising from this manufacturing process was controlled in 1973. Annual inspections of the facility are carried out by both IEPA and CDEC, but most actions concerning this source hinge on the IPCB's decision on the facility's rule change petition.

3.7.1.5 Performance and Problems with Control Equipment

No major malfunctions have occurred with their control devices. However, the source feels that the capital investment for control has not been proportional to the overall efficiency of the equipment (i.e. new controls have not always worked).

3.7.1.6 Chronology of Permits and Exceedances

The City of Chicago was active with this source from March 1970 through August 1973. In October of 1970, a progress reporting requirement was developed by the Appeal Board concerning the source's odor problem. These progress reports were delivered to the Appeal Board on a three month basis. Once an acceptable odor test of this facility proved positive in July of 1973, the City discontinued its enforcement activities. Upon denial of a permit renewal, the facility decided to petition for a rule change through the IPCB in late 1975. This petition is still pending as outlined in Section 2.7.1.4.

3.7.1.7 Emission Profile

An annual, organic emission profile is depicted in Figure . Although operating in excess of allowable emission levels, the facility disputes IEPA's claim that the process is of a petrochemical nature and not organic for which a different regulation applies. The facility has petitioned for a rule change and the case is pending.

3.7.1.8 Conclusions

The initial problem with this facility was odor nuisance, which was corrected in 1973. However, the facility has petitioned for a rule change because it believes that the process it operates is an organic one and not a petrochemical process. Consequently, the compliance status of this facility depends upon the outcome of the decision. The IEPA and CDEC have been actively involved in bringing the facility into compliance.

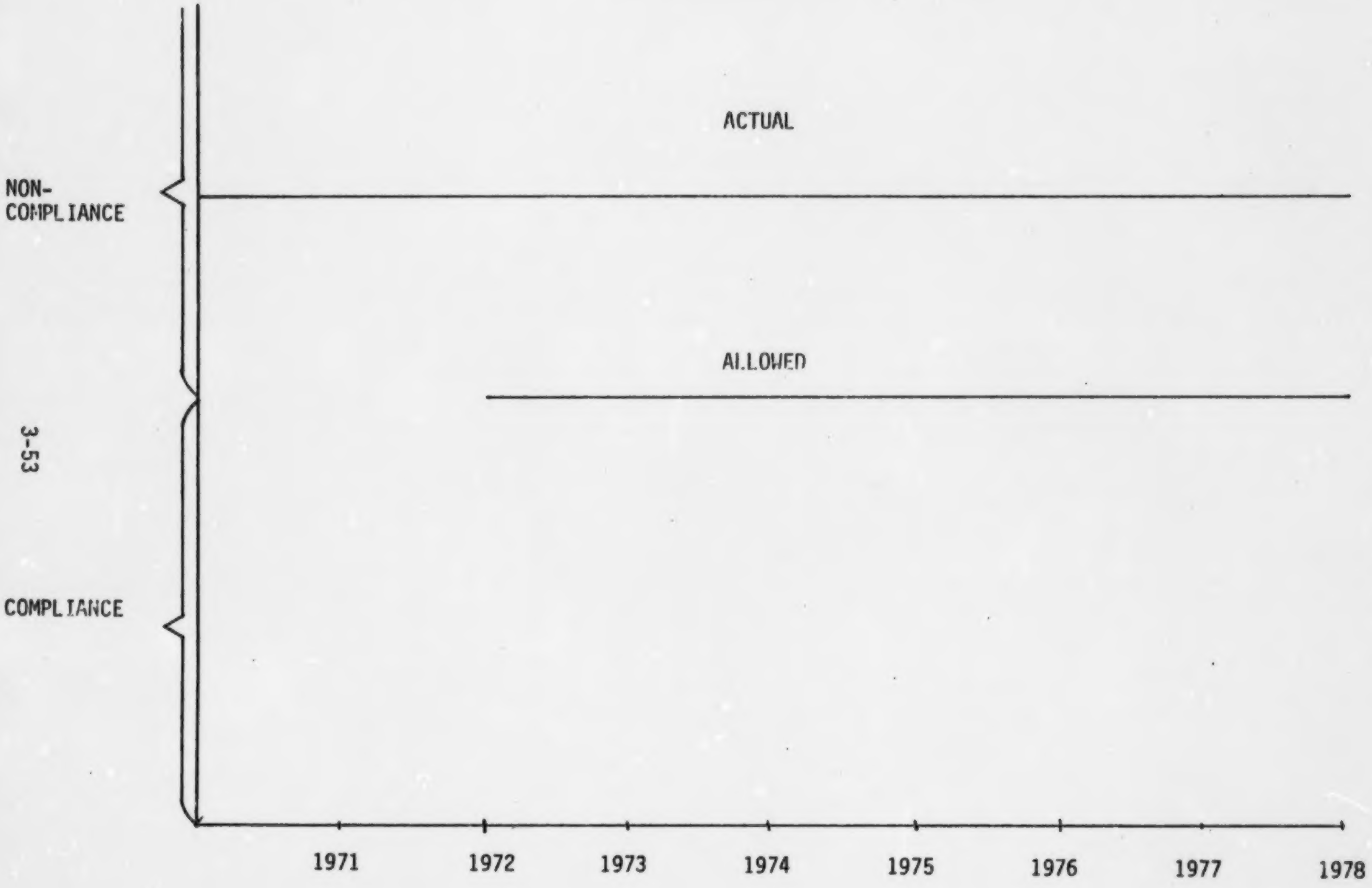


Figure 3-13 ANNUAL EMISSIONS PROFILE (ORGANICS)

3.7.2 FACILITY NUMBER 2

3.7.2.1 Facility Description

This facility is a large paint manufacturer located in a highly industrialized section of the city. The source employs over 1500 personnel and has a 24 hours/day, seven days/week, 52 weeks/year operating schedule.

Raw materials utilized in the paint manufacturing process include pigments, solids, solvents, and various vehicles. The average production rate is 300,000 pounds/hour and the average solvent usage ranges between 1250 pounds/hour and 5000 pounds/hour.

3.7.2.2 Key Operations and Pollution Control Equipment

Paint manufacturers generate large quantities of particulate matter in the products mixers and the pigment (solid ball mills). A dry baghouse was installed by the facility in 1954 in an effort to control these emissions. A Rotoclone Wet Collector was added in 1964 increasing the processes' overall control efficiency to 99 percent.

3.7.2.3 Financial Impact

The original 1954 dry baghouse was installed at a purchase price of $11,863, while the wet rotoclone was purchased for $29,200. Annual operating costs for both units are $18,900, while annual maintenance expenses are $9,000. The facility maintains a computerized maintenance record which facilitates compilation of records.

3.7.2.4 Decision Making

The IEPA conducts annual engineering inspections while the CDEC conducts both annual surveys and periodic surveillance by its roving inspectors. The CDEC's surveillance is conducted on a weekly basis since the plant is located in a highly industrialized area.

3.7.2.5 Performance and Problems with Control Equipment

Malfunction reporting has not been performed by this facility on a routine basis. If the facility needs to document any malfunction, the source relies upon its computerized operation and maintenance log. The plant supervisor reported that he has had good success with this method of record keeping.

3.7.2.6 Chronology of Permits and Exceedances

The facility initially applied for an operating permit from the IEPA in October 1972. The IEPA issued this permit in February 1973. This operating permit was renewed in December 1977. All control equipment has been installed prior to 1972 (see Section II). Annual inspections by both agencies are conducted on an annual basis.

3.7.2.7 Emission Profile

As has been seen in the yearly emission profile, the source had controlled its particulate emissions well before the implementation of air pollution requirements. No problems have been encountered with respect to permits (either state or city). The source has never been cited for pollution violations.

3.7.2.8 Conclusion

The source has been in compliance with all applicable air regulations. All permits have been issued in an efficient manner. Compliance evaluations have been conducted on an annual basis by the IEPA probably due to the size and number of point sources in the entire facility.

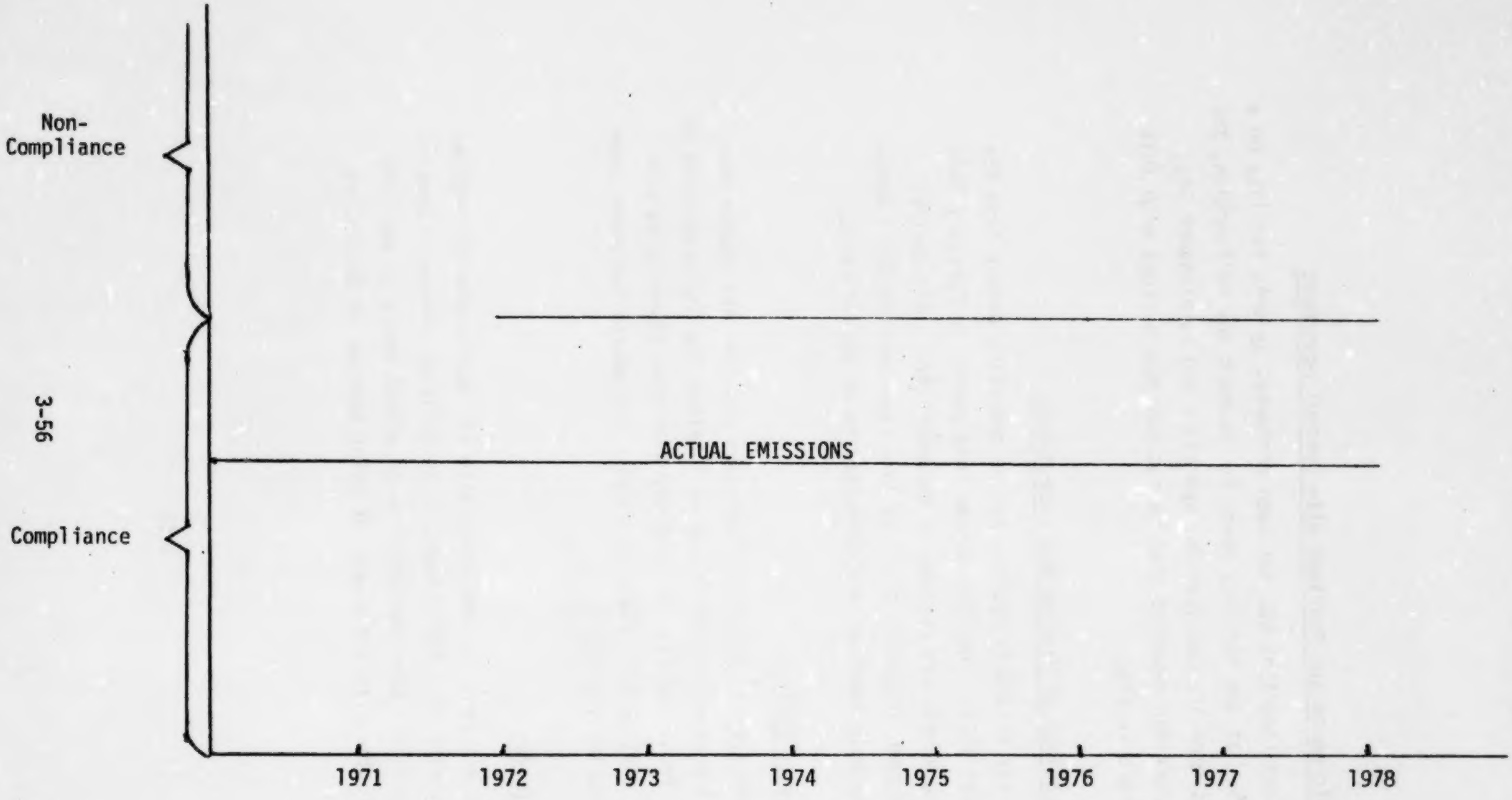


Figure 3-14 ANNUAL EMISSION PROFILE (PARTICULATE)

3.7.3. FACILITY NUMBER: 3

3.7.3.1 Facility Description

This facility is a large chemical manufacturing concern, employing approximately 600 salaried and 1200 hourly workers. This source produces a wide variety of chemicals, including components of inks, paints and other pigmented coatings, and insecticides. Operating schedules vary depending upon the process and operation performed, but can be considered as a 365 day per year and 16 to 24 hour per day operation.

The process covered in this report is for the production of Isophthalonitride (IPN). This is a confidential, proprietary operation, therefore, information is limited; however, the process involves the ammoxidation of xylene in a fluid bed reactor. Hydrogen cyanide (HCN) is a by-product formed by this process. Raw materials include meta-xylene, anhydrous ammonia, and a catalyst. The effluent wastewater is contaminated by various organic residues and ammonia, while the air stream contains HCN, solvent vapors, and ammonia.

3.7.3.2 Key Operations and Pollution Control

An incinerator was chosen in 1972 to assure destruction of cyanides. The incinerator also consumes another by-product, pitch. Operating temperatures are in the range of 1500°F. Detailed information concerning process input and output was not disclosed due to the nature of the process. The final product must be flaked before packaging which creates a fugitive dust problem. The facility operates a small 980 cfm baghouse rated at 99.9 percent efficient to control these particulate emissions.

3.7.3.3 Financial Impacts

Initial capital cost of the incinerator was estimated in 1972 to be about $329,000. Annual operating costs are approximately $281,000, a large portion of which is for fuel. Maintenance costs are estimated to be about $13,000 per year. Another $130,000 per year is required for the disposal of incinerator wastes. The baghouse, which controls the IPN particulate dust problem was installed in 1972 at a cost of $8,800. Annual operational and maintenance costs were approximated to be $1,000.

Other costs associated with control regulation requirements were unspecified costs for two stack test which were necessary for state approval of the IEPA operating permit.

3.7.3.4 Decision Making

The source decided to construct the IPN facility in early 1972. A construction permit was applied for immediately, and was granted three months later. An incinerator was deemed the only practicable control device since it would not only control solvent emissions, but also destroy any cyanide emissions. The IEPA required a state test of the incinerator before issuance of an operating permit. The first test performed by the facility was not accepted by the state agency due to technical flaws in the test procedure. The company subsequently performed a second test which was accepted by IEPA. This source test certified the process's compliance status with the state's regulations. No further actions other than annual state and local agency inspections have been undertaken with respect to this operation.

3.7.3.5 Performance and Problems

Onstream time for this system was estimated to be on the order of 99 percent. Sundry electronic, electrical, and mechanical failures have occasionally shut down the incinerator. Whenever the incinerator has a mechanical failure, the entire process is terminated. No formal procedure is used by the source to report malfunctions and their associated emissions. All malfunctions are recorded by the operator in his daily log.

A construction permit for the incinerator was made on January 21, 1972, and granted on April 12, 1972. An operating permit was applied for in October 1972 but was not granted until January 1974. The operating permit was renewed on October 13, 1978. A stack test was required by the state for the incinerator. Otherwise, no significant problems were encountered in obtaining the original permit. Both city and state inspectors visit the plant on an annual basis.

3.7.3.7 Emission Profile

The facility has never been cited for violations since its initial operation permit was granted. Control equipment malfunction automatically shut down process operations insuring continuous compliance with air pollution regulations.

3.7.3.8 Conclusions

This facility has numerous processes which necessitated control equipment. Operating and Maintenance costs for the incineration of pollutants has spiraled to $294,00 due to high fuel and solid waste disposal costs. Facility personnel also commented that possible future regulations could substantially increase solid waste disposal expenses.

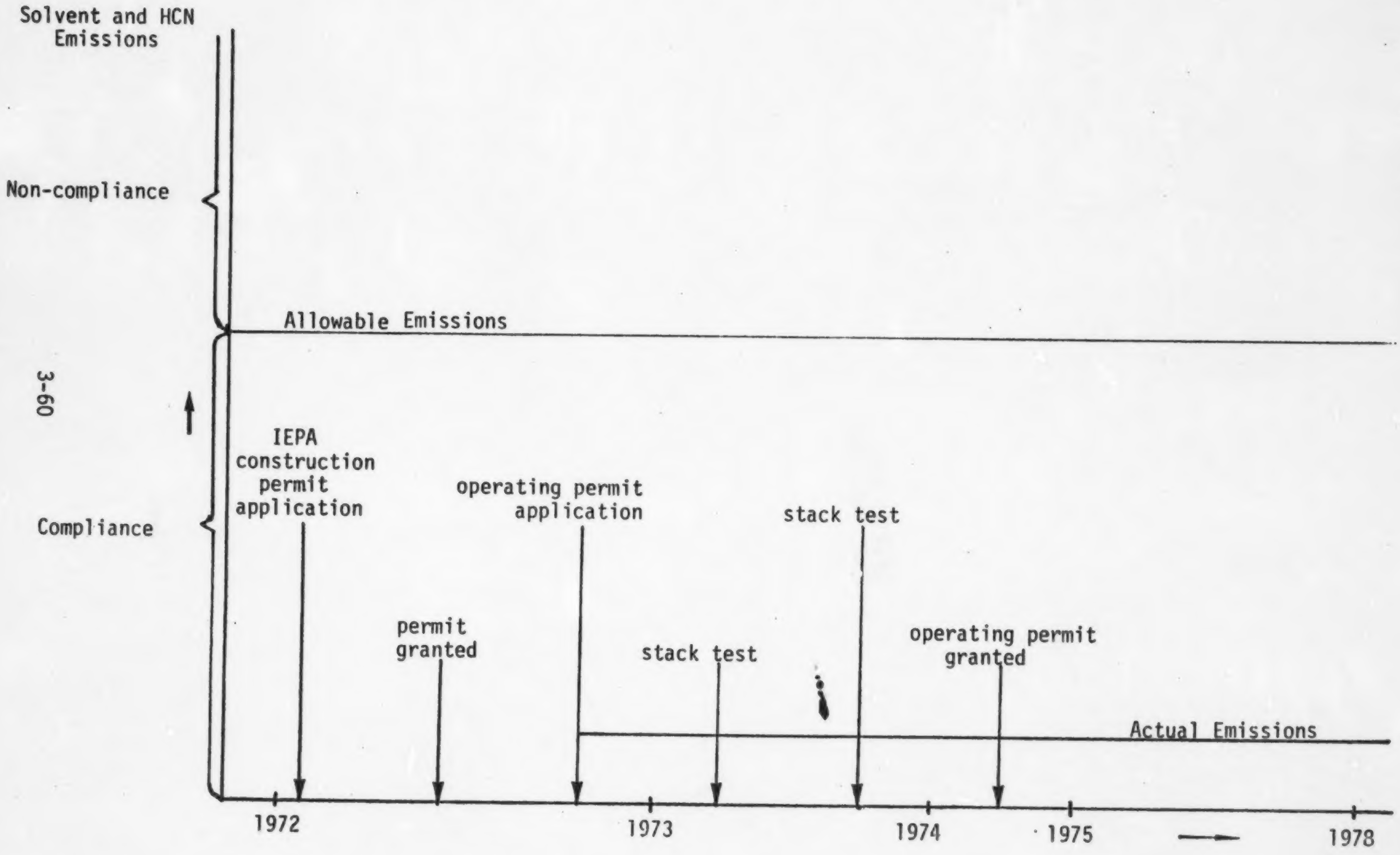


Figure 3-15 ANNUAL EMISSIONS PROFILE (Solvent and HCN Emissions)

SECTION 3.8
MINERAL PROCESSES

3.8 SOURCE CATEGORY: MINERAL PROCESSES

3.8.1 FACILITY NUMBER 1

3.8.1.1 Facility Description

This facility is a lime transfer depot located on a shipping canal. The facility receives and unloads barges of preprocessed (sized) lime. The 1,500 ton barge is unloaded in about five hours by a clamshell bucket and dumped into a huge receiving hopper, to be transferred to an inclined belt conveyor. This conveyor feeds an elevator-bucket system which discharges into a diversion bin to feed alternately one of four 500 ton storage bins. Telescoping discharge spouts from each bin are utilized for loading account delivery trucks. No other processing occurs on-site.

This is one of the largest lime transfer plants in the area, employing three full time employees and six contract workers. The barge unloading operation occurs eight hours/day, five to six days/week. Truck loading is performed around the clock by private haulers. Annual throughput varies from 487,000 to 150,000 tons/year, with a reasonable average being 250,000 tons/year.

3.8.1.2 Key Operations and Control Equipment

Potential emission problems at this facility are limited to particulate matter. It should be noted that the particulate in question is an irritating and somewhat hazardous substance, as it reacts violently with water. For this reason, all loading/unloading operations are curtailed in the event of rain or winds in excess of 20 knots. Additionally, because of the obnoxious nature of the product, workers handling the finer of the two material grades receive a pay premium.

The source has several potential emission points including hopper loading where the bucket discharges; the transfer point between the hopper and the inclined belt; where the belt discharges onto the bucket elevator, and the final unloading point where the telescoping spouts discharge into the account trucks. Fugitive emissions could be a problem if trucks were overfilled and uncovered.

Fugitive emissions are now controlled by covering all loaded trucks with tarpaulin, and sweeping the newly paved lot with a mechanical sweeper/vacuum. Process controls included an enclosed clamshell bucket, an induced draft baghouse on the receiving hopper, further expansion of the telescopic loading spouts, and the addition of a second baghouse and hoods with interlocks for truck loading.

3.8.1.3 Financial Impact

The initial cost incurred by the facility involved the purchase of a small $2,500 ($3,800) street sweeper and the asphalting of the facility lot. The initial installation of the facility's baghouse resulted in a $250,000 ($373,700) expenditure. During 1973 the facility requested a variance from the IEPA due to unexpected delays in the start-up of the new control equipment. Although the variance was granted, a $5,000 ($7,200) fine was levied by the Illinois Pollution Control Board for the previous emission violations. In addition, a $50,000 ($72,400) performance bond was also required of the facility to insure completion of the baghouse within the one year period of the variance. In 1975 the City of Chicago Department of Environmental Control (CDEC) processed a citizen complaint concerning the facility and subsequently imposed a $12 ($14) fine. The facility was then informed that it could not unload barges with their present equipment when wind speeds exceeded 20 knots. Since the installation of the baghouse, the company has realized an undetermined positive return of investment since the lime which would have become particulate emissions is now captured and sold as product.

3.8.1.4 Decision Making

The company on its own initiative began in 1971 to investigate the possibility of controlling the particulate emission from the barge unloading and truck loading operation. The IEPA regional office visited the facility in March, 1972 and determined the facility was in violation of the State's particulate standard. At this time a Notice of Violation was sent to the facility's Corporate Office and requested the facility to formulate a formal compliance schedule. The IEPA continued to inspect the facility on a relatively regular basis until compliance was finally achieved (3/72; 4/72; 1/73; 1/74 - facility out of compliance: 3/74 - marginally out of compliance: 2/75 and 6/75 - in compliance).

In early 1973 the company petitioned the Illinois Pollution Control Board (IPCB) for a variance with respect to their particulate emissions. As stated in the previous section the variance was granted with the issuance of a fine for previous violations and the posting of a performance bond.

During a routine annual survey by the CDEC in March, 1972, their local inspector denied the facilities Certificate of Operation (COO) due to excessive particulate emission. At this time the facility was revisited by the CDEC engineering department to determine its actual compliance status. During the next two years the Chicago Appeal Hearing Board met eight times with the source to review the facilities progress with respect to its compliance status. Once the second baghouse was installed the CDEC engineering department revisited the plant and determined that more control was necessary to control the fugitive dust problem. A Supersedeas was granted for six months to allow the company time to complete installation of four loading doors which would control the fugitive dust problem. Once the installation was complete, the CDEC returned the source to their field engineers and no further enforcement action was taken.

All decisions concerning this facility's choice of control equipment are made by their corporate headquarters.

3.8.1.5 Performance and Problems

The facility has, according to the manager, encountered three air related problems since receiving the initial citation. Equipment malfunctions were the cause of two of these incidents. The first resulted when the pulley belts on the larger baghousae fan burned up. The second incident occurred when an improperly installed bag ruptured. The facility has since gone to new, nylon fabric bags which are less prone to caking. The plant manager promptly reported these occurrences to the CDEC per the malfunction reporting requirements, however, he did not report the malfunction to the state.

The third problem developed due to excessive winds. Fugitive dust was generated as lime particles from the barge were entrained and blown across the canal. In response to a citizen's complaint, the CDEC issued a ticket for causing fugitive emission. The complaint developed into a court case. A settlement was reached in which the CDEC Air Pollution Court required cessation of unloading operations during periods where wind speeds are in excess of 20 knots. Operations must therefore be discontinued when either of two climatic conditions occur (rain or excess winds).

3.8.1.6 Emissions Profiles

The annual particulate emissions profile is shown in Figure 16. As indicated in the qualitative emissions representation, the facility was out of compliance until 1975. Although a baghouse was installed in 1973, the particulate emission standards were not met immediately because of equipment failure. The facility was listed to be in compliance in 1975.

3.8.1.7 Conclusions

The facility seems to have taken adequate steps to reduce dust emissions and agreed to cease its operations in the event of rain or gusty winds. Even though some initiatives were taken by the facility to collect particulates, the control equipment was installed at the behest of IEPA and CDEC.

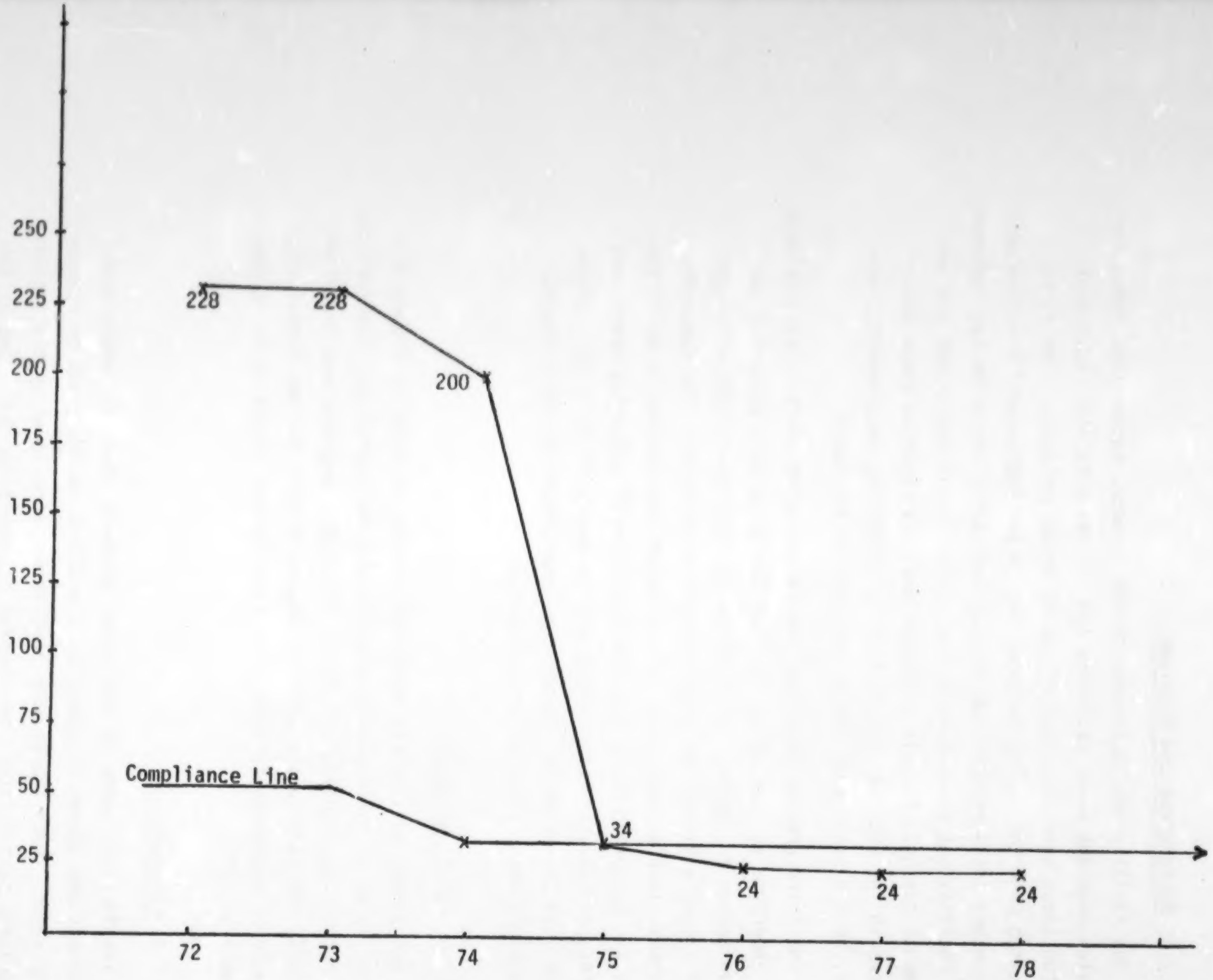


Figure 3-16 YEARLY EMISSIONS PROFILE (PARTICULATES)

3.8 SOURCE CATEGORY: MINERAL PROCESSES

3.8.2 FACILITY NUMBER 2

3.8.2.1 Facility Description

The facility manufactures building bricks. Originally common house brick and concrete block was made at this site. In 1966, the brick plant was removed and only concrete block is manufactured. About 15 people are employed for a 40 hour work week at this 48 acre site. More recently, production has been curtailed due to the lack of available cement, a necessary input material for this process.

3.8.2.2 Key Operations and Pollution Control Equipment

Storage bins and brick molding machines with their related transfer machinery are the emission sources related to normal operations. The bricks are normally air cured; however, if bricks are needed quickly because of sales demands, an oil-fired autoclave is used for curing.

Pneumatic conveyors to the storage silos receive the incoming materials which are powder-like in nature. Coarse aggregates do not present a problem. Other transfer operations are controlled by small bags. The bags inflate during operations and deflate and self-clean when operations cease. (This is a one bag unenclosed baghouse).

3.8.2.3 Decision Making

The general manager at the facility is also the vice president of the small, closely owned company. He is rsponsible for management decisions relating to all facets of operations.

3.8.3.4 Financial Impact

This facility has been in operation with the described control devices prior to 1970. Hence, no cost data is available. No estimate of maintenance costs of the bags was available.

3.8.2.5 Performance and Problems

Good housekeeping procedures relieve the potential problems. These procedures were in evidence at the beginning of the study period.

3.8.2.6 Chronology of Permits and Exceedances

Permits to operate were applied for in July 1973. An inspection report at that time revealed no problem. Interactions throughout the period were routine and no problems with emissions nor adminsitrative requirements are evident.

3.8.2.7 Emission Profile

The facility's emissions are in compliance at all times by using enclosed conveyors, pneumatic conveying, and "bags".

3.8.2.8 Conclusions

The facility, though small, has controlled its emissions on its own volition prior to the regulatory process. The source has had no difficulty complying with the administrative requirements.

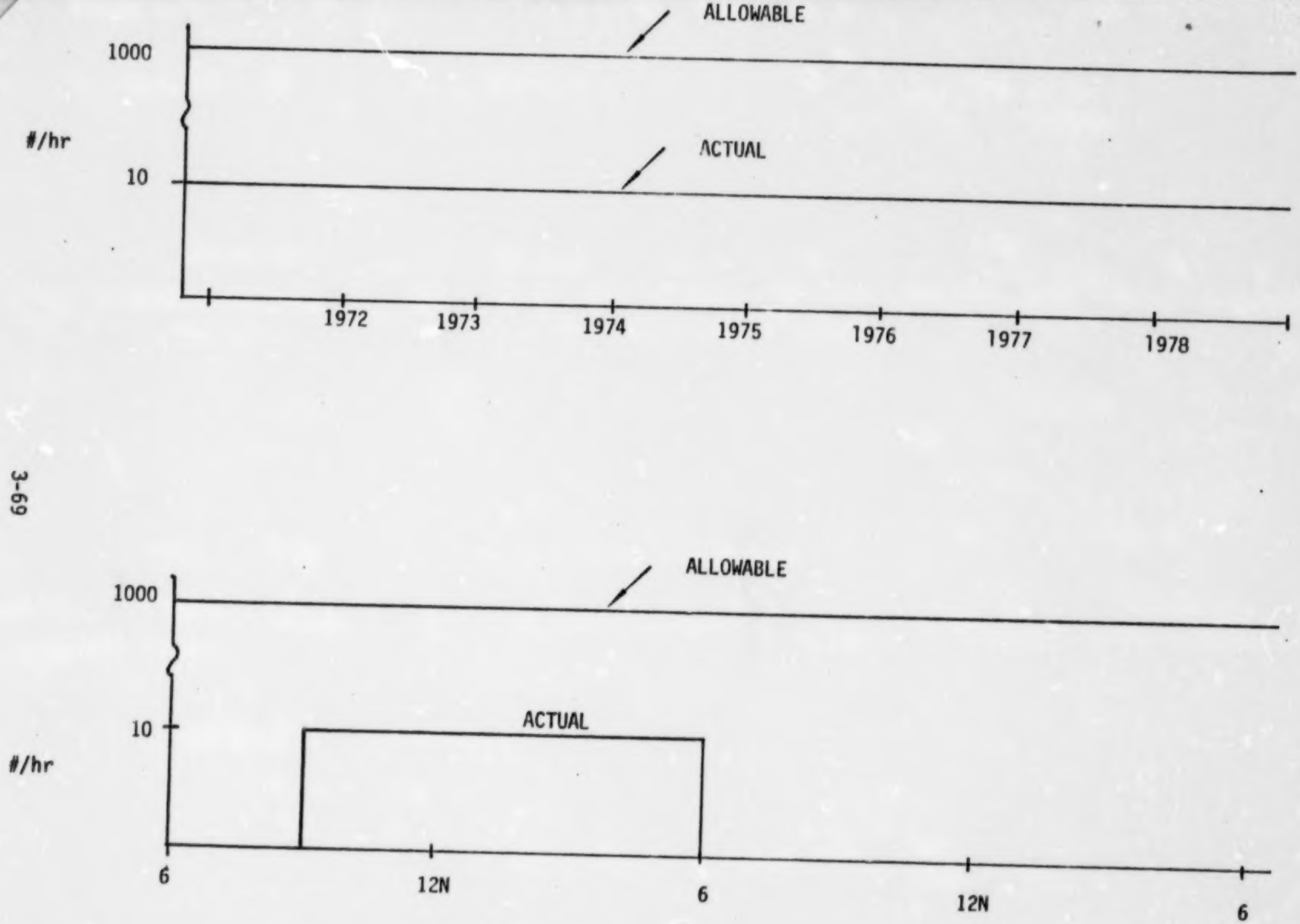


Figure 3-17 TSP EMISSIONS PROFILES

SECTION 3.9
GRAIN HANDLING

3.9 SOURCE CATEGORY: GRAIN HANDLING

3.9.1 FACILITY NUMBER 1

3.9.1.1 Facility Description

This facility is a large grain handling and storage facility. The source is located on a 70 acre site and has facilities for truck, rail, and barge operations. The site is in operation around the clock, throughout the entire year. However, no single source within the facility operates on that schedule. A typical source operates eight to 17 hours/day, five to seven days/week, and 52 weeks/year. A small number of sources are only seasonally operated about four months of the year.

3.9.1.2 Key Operations and Pollution Control

Each of the many conveyors, loading/unloading chutes, storage silos, etc. is a source of emissions. A total of 33 baghouses of various sizes are used to control TSP emissions. Three grain dryers are used to reduce the moisture content to improve product quality and they are sources of TSP with respect to the handling operators.

3.9.1.3 Decision Making

The plant superintendent is responsible for the day-to-day maintenance of the control equipment. Management decisions for the central equipment and its upgrading rests primarily with the regional superintendent. The upper level management of this national corporation retains an "overview" type role only.

3.9.1.4 Financial Input

The facility began a program to install baghouses at this site in 1962. The first one became operational in 1966. No breakdown in costs were available for the past 1970 portion of the control program.

However, since 1962, four to five million dollars have been spent covering bins, conveyors, and the installation of baghouses. The most recent installation, a baghouse for five barge loading chutes costs $30,000 in 1977. Only a single chute at a cost of $20,000 in 1977 had been installed by the end of this study period.

The cost of maintenance is not quantified. However, one and one-half to two men are assigned to control equipment maintenance every shift.

3.9.1.5 Performance and Problems

The baghouses have solved the emissions problems of the source with the exception of the barge loading operations. Here a visible emissions problem still exists and the equipment installation was in progress at the end of the study period.

There is a maintenance problem with the upkeep of the baghouses. High humidity causes the grain to form a cake on the bags. This necessitates the removal and washing of the bags four to five times per year. Pressure drop across the bags is monitored. Hence, a bag break is detected promptly. The maximum time needed to replace a bag is four hours from the time the break is first detected. This minimizes the down time of the control devices and the excess emissions.

3.9.1.6 Chronology of Permits and Exceedances

The facility began a "compliance program" to install baghouses on its emission points in 1962 in response to CDEC. The first baghouse became operational in 1966. This schedule called for over 30 baghouses and extended through 1976. THe program was completed near its schedule with the exception of the barge loading operations.

Control in this area borders on the state of the art and had not been resolved at the end of the study period. There was substantial interaction with CDEC with over 100 memos/reports/hearings in the CDEC files. The progress of installing the baghouses was closely monitored and the facility likewise kept CDEC informed of any problems as they developed.

The interaction with IEPA parallels that of CDEC. Engineering reports/opacity readings existed throughout the study period indicating that IEPA monitored the compliance program. Permits were issued and renewed without notable problems.

3.9.1.7 Emission Profiles

The annual profile illustrates in a step function pattern the baghouses coming into operation. A daily profile illustrates compliance at all times. The magnitude of the controlled level is set to unity since it changes greatly and is dependent upon the number of transfer operations utilized simultaneously.

3.9.1.8 Conclusions

The source had developed a program prior to the Clean Air Act and while the various agencies closely monitored it, they did not alter it to meet the original 1975 attainment date. The CDEC did interact more closely with the facility while the IEPA was content with an overview approach.

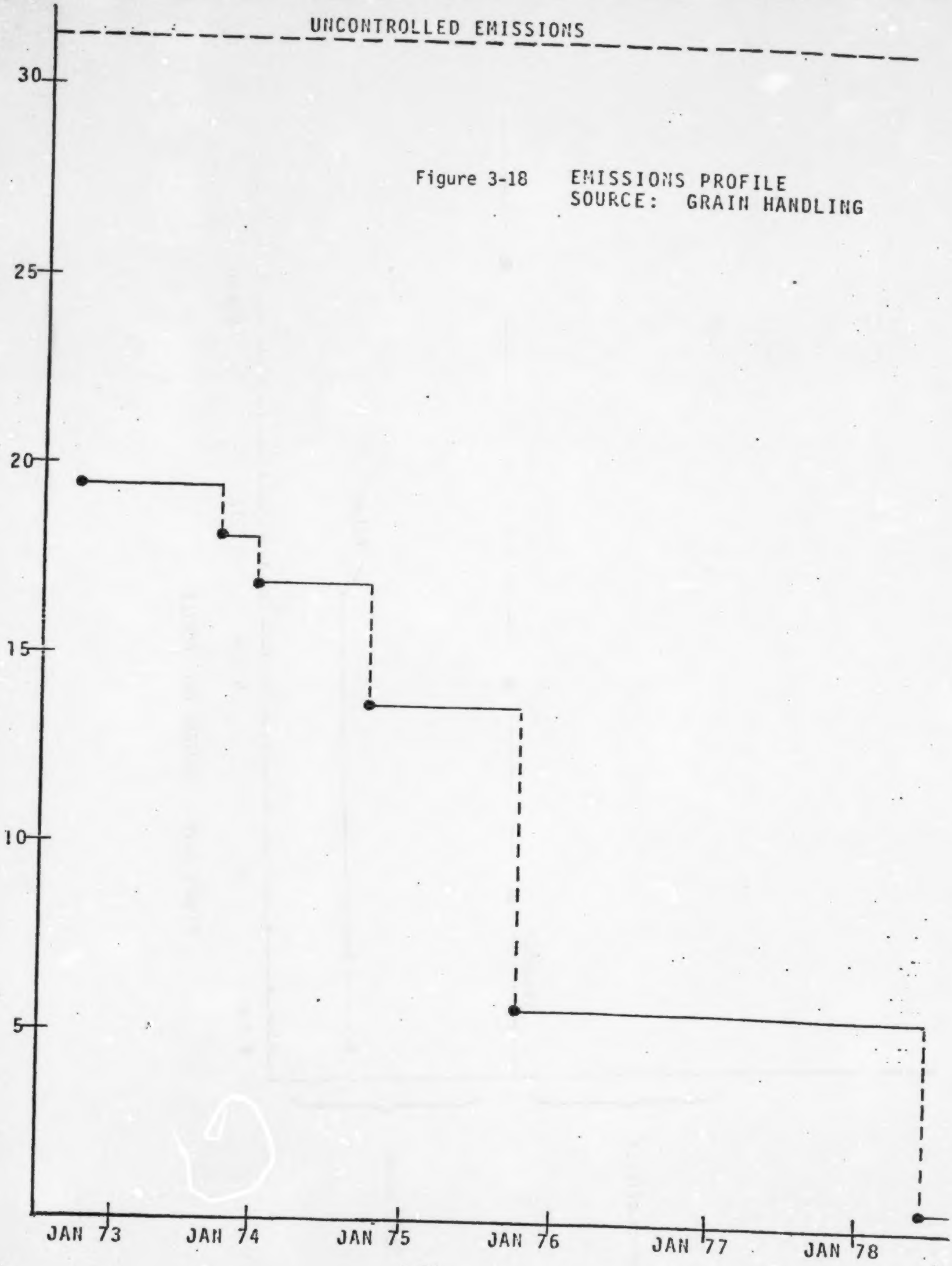


Figure 3-18 EMISSIONS PROFILE
SOURCE: GRAIN HANDLING

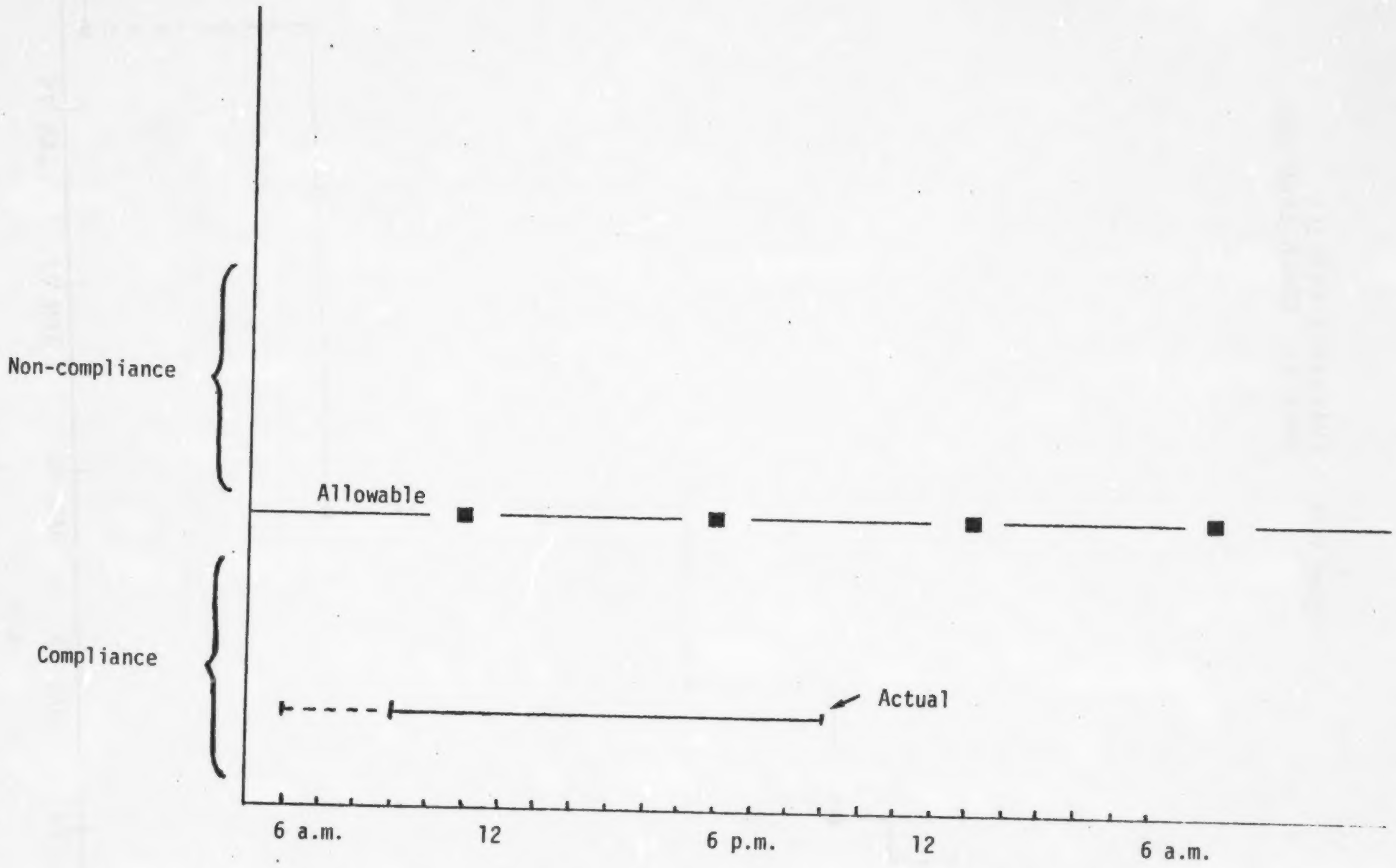


Figure 3-19 TYPICAL DAY PROFILE

SECTION 3.10

LUMBER AND WOOD PRODUCTS

3.10 SOURCE CATEGORY: LUMBER AND WOOD PRODUCTS

3.10.1 FACILITY NUMBER 1

3.10.1.1 Facility Description

The facility produces wooden cabinets as an OEM supplier to the coin-operated amusement machines industry (i.e., pinball and bowling machines). Entirely family owned, the business was begun in 1921, incorporated in 1929, and moved to its present location in 1945. Usable floor space totals about 55,000 square feet. The plant employs approximately 90 personnel on an eight hours per day, five days per week work schedule.

Cabinets are constructed of fine quality plywood, hardwood, and composite board. These raw materials are shipped in by truck. The cabinet-making process includes machining and forming, assembly, and final finishing. Forming operations include all those processes common to the woodworking industry such as sawing, edging, planing, boring, milling, and sanding. Assembly involves joining members by glueing, laminating, and applying fasteners. A sealer and finish is applied to customers' specifications (patterned) as a final operation prior to shipping.

3.10.1.2 Key Operators and Pollution Control Equipment

The woodworking operations generate a large variety of wood waste material which must be evacuated from the various work areas on a periodic, if not continuous, basis. A pneumatic conveyance system is employed to "pick-up" and transfer this material to a roof mounted simple cyclone collector. Two 40 H.P. motors drive the system air movers. Collected material is dispensed to a storage bin located adjacent to the boiler room.

Two low pressure 150 H.P. Pacific Boilers are operated by the facility exclusively for space heating purposes. The primary heating source is a wood waste boiler which utilizes the waste generated by the facility. Installed in 1945 (or 1946), the boiler combusts the fuel in suspension via a process known as the Vastine system. Material from the waste storage bin is screw fed to a hog (combination chopper/blower) which injects the waste into the boiler combustion chamber.

The second boiler is fired on No. 2 grade fuel oil. It is utilized only during non-working periods (i.e., nights and weekends) and periods of extreme cold. It is the only unit on line during non-work periods.

Paint and lacquer finish is applied in one of ten spray booths. A heated airless spray method (15 to 40 percent solids) is employed to conserve paint and reduce solvent usage (higher solids content).

The major source of air pollution at this facility is the wood waste boiler. Particulate matter concentrations of the effluent from this unit have been found to be in excess of the particulate weight emission standards (by application of emission factors). The opacity of the waste boiler emissions have also been found to exceed the visible emission standards.

Another source which directly impacts air quality is the paint nd finish operation. The solvent vehicles employed in paint application are exhausted through double pad filters, thereby reducing particulate emissions generated by this process. Gaseous emissions are, however, vented to the atmosphere untreated. The facility, therefore, represents a source of hydrocarbon emissions as well.

The company president stated that the relay cyclone had been stack tested by the manufacturer several years ago. He further stated that the results of this test indicated that the device possessed an 80 to 85 percent collection efficiency. Although a copy of the test was not available at the time of the visit, all evidence seems to imply that the cyclone is, indeed, in compliance.

3.10.1.3 Financial Impact

In late 1972 the company had an electrostatic precipitator installed at a cost of $2,500 ($3,800). This unit failed to provide adequate control due to frequent component failures. The manufacturer returned a number of times in order to repair the unit at minimal charge to the facility. No longlasting solutions were reached, however. The company ceased operation of the unit approximately a year later. It was not until 1976 that another effort to control emissions was made.

Around mid-1976 the company president contracted with an environmental engineering firm to design and install a control device which would bring the boiler into compliance with state and local air pollution control regulations. The cost of the complete installation approached $35,000 ($39,800) (according to the company president). The control device itself was delivered at a cost of approximately $27,000 ($30,701). Additional tangible costs were incurred for erection, installation, and the installation of new electric service (approximately $3,500 ($3,900)).

In speaking with the president, it was learned that the company was in the process of letting a new contract with the consulting firm which engineered the filter/furnace collection device. The consultant has presented the company with a quote of $22,400 for the modification of the present boiler.

Other pollution-related costs include fines imposed by the CDEC for visible emission violations. In the president's recollection, ten to 12 tickets were issued to the source by the CDEC which resulted in fines of $100 each.

The company does an average sales volume of approximately $2,5000,000 a year. A work force of 90 personnel include four salaried administratives, while the rest are on an hourly basis.

Fuel savings realized by utilizing the waste wood material is the sole incentive for continuing the wood waste boiler. The facility manager estimated that heating oil requirements would increase five fold with the cessation of the wood waste boiler operation. At a nominal 40 cents per gallon, he presently purchases $15,000 to $18,000 (41,000 gallons) worth of No. 2 grade oil annually. Eliminating the wood waste utilization could increase fuel to the range of $60,000 to $72,000 per year.

3.10.1.4 Decision Making

Since the facility is a family-owned concern, major decisions are made by the owner and company president. He explained to the investigators that he was not very knowledgeable in the technical disciplines associated with pollution control and was, therefore, inclined to enlist the services of a consultant/contractor to handle such affairs. His consultant is presently charged with the responsibility of providing technical assistance in the aquisition of construction and operating permits as well as achieving compliance with state and local air pollution standards.

In his first attempt to remedy the emission problems associated with the waste boiler, the president decided to have a precipitator installed. His decision to select this type of control technology was chiefly influenced by the overwhelming costs of alternative controls such as a scrubber. Problems encountered with this first device seemed to have prompted him to consider hiring a consultant in the future. When confronted a second time with the task of abating boiler emissions, the company president solicited the aid of a contractor. He was advised of this contractor by a competitor who had recently had this firm in to install a gas cleaner on a similar wood waste boiler system. Unfortunately, the technology offered had not been adequately proven.

The company has now contracted with the same firm to modify the present boiler in such a way that a cleaner, more efficient burn will be achieved (through secondary combustion zone). The gas scrubber will be refurbished and put on line to increase overall control efficiency of the system. The contractor has converted similar systems to waste incinerators with successful results, thereby influencing the facility's decision to go with him again. Personnel from CDEC feel this latest improvement will be effective, as evidenced by their decision to grant a P of G for the conversion work (granted October 1978).

The company president indicated that his efforts to meet regulatory requirements were very plainly made in response to agency pressure to do so. He stated that he probably would not have been able to justify the expense of control as a voluntary action and that regulation was definietly the chief motive for controlling emissions.

It was the president's intention to coordinate control programs concerning his plant to the CDEC. Although no formal control plans have actually been required of the source by either agency (i.e., a plan which establishes increments of progress), their notices and communications concerning non-compliance were geared toward achievement of compliance by some milestone date. The CDEC took the approach of arbitration rather than that of taking enforcement actions against the facility, monitoring progress toward such ends by maintaining constant interaction with the source. The IEPA played second party to these negotiations, involving itself only in the form of routine inspections and the processing and issuance/denial of permits. The company president commented that state inspectors did not offer any recommendations or discuss any corrective actions.

3.10.1.5 Performance and Problems

Throughout the past decade the company has taken measures to alleviate the problems connected with the wood waste boiler. Prior to the early 1970s, the boiler was meeting pollution limitations since these were, for the most part, written in the form of nuisance abatement/prevention ordinances. In response to more specific control regulations, the facility had the boiler fitted with a small electrostatic precipitator around December of 1972 at a cost of $2,500 ($3,800). The unit experienced continuous component failures (i.e., anode wires would burn up) throughout its shortlived operation (1971-72). As a result, facility management decided to discontinue the troublesome equipment.

Around April of 1976 the company embarked on a major effort to achieve compliance. The company president related that a "big pressure" was exerted by the local agency for some corrective action during the years 1975 and 1976. In response to this pressure, a contract was let with an environmental engineering firm which specialized in incineration devices. The contractor proposed the installation of a fume collection device which had proven successful in the control of particulates and aerosols for a number of different applications. The unit, which was scheduled for completion by August of 1976, was designed to implement reverse pulse cleaning. This system experienced operational difficulties, however. The filtering medium employed is integrated too quickly (short burn-out time) due to the nature of the effluent. The combustion of wood generates tars and resins which coalesce on filter material to form a residue. The back pulse unit proved ineffective in leaning so that the residue built up and eventually ignited. The gas cleaning unit was not functional at the time of the visit. Admittedly, the company president stated that the waste boiler was "now probably out of compliance". In researching agency files it was established that the source is indeed operating in violation of IEPA regulations since it no longer has a valid operating permit.

Inadequacies in the design of the fume collection system, as related to this type of application, resulted in drastic component failure. The device was therefore found to be unsuitable for controlling emissions from this source.

3.10.1.6 Chronology of Permit and Exceedances

The company initially applied for state permits in March of 1973. These forms were returned to the facility upon receipt due to the lack of an authorizing signature and insufficient data. Just prior to this correspondence, the IEPA sent out a warning letter, informing the facility that it was presently considered to be in violation of several APCB regulations. The company had, among other things, failed to secure an installation permit for the electrostatic precipitator and had been found to be emitting particulates from their painting booths in excess of the allowable emission level (mainly due to lack of maintenance). These potential violations were detected as a result of a routine inspection conducted in early March 1973 by the state regional office.

The facility reappplied for the required permits in May of 1973. Included in this submittal was a statement noting that all work on the precipitator had been stopped pending approval of their permit application. A construction permit for the electrostatic precipitator was subsequently granted in June of 1973. IEPA granted an operating permit for the facility woodworking processes in late August of 1973 (the same had been denied in May of 1973). Permits were granted following a reinspection (early August) which found the source to be successfully implementing their program to eliminate previously cited problems. This first facility operating permit was valid through July 1978.

No documented actions relating to this facility were discovered for the years 1974 and 1975. The next regulatory event was found to occur in April of 1976. As noted previously, the president indicated that the CDEC had issued numerous smoke violation tickets during this period. These tickets resulted in the imposition of $100 fines.

In early April of 1976 the facility was revisited by IEPA inspectors as part of an AQMA field verification project. The investigation uncovered what was termed two "apparent violations". Once again the facility was cited for failure to obtain a construction permit prior to the installation of a control device for the wood waste boiler. The facility had already contracted with a consultant to supply a control device for reducing emissions from the boiler without IEPA approval. Emissions from the boiler itself were calculated to be in excess of 0.1 lb/10^6 BTU heat input. The control device alluded to here is the filtering system which, to date, has proved ineffective due to component failure (burn-out of filtering media). Indications of remedial action to be presented in the form of a formal control program were required by a written communication from he desk of the IEPA regional manager (dated April 1976).

Accordingly, a construction permit application was filed with the IEPA in May of 1976, requesting agency approval to remove the inoperable ESP unit and replace it with a new fiber filter device. Upon evaluation, the IEPA saw fit to issued a permit to construct a month later. One special condition was included in this permit grant; stack tests were to be performed within 30 days of commencement of operation. The facility also sent out a status summary in May which contended that their contractor had secured city operating certificates.

More frequent interaction by the CDEC began around June 1976. Excerpts from CDEC files indicate that the facility petitioned for a period of grace on three separate occasions from that time through December 1977. Two of these requests for additional time allowances were decided in favor of the facility. The third request, made in mid-January of 1977, was denied. A permit to construct, had, however, been approved for the boiler exhaust control device by the CDEC (installation permit) in late July 1976. Delays in progress on the installation and start up of the unit forced the company to request these P of G's. Unfortunately, operational difficulties due to design inadequacies were steadily pushing the compliance date back. Chicago DEC engineers viewed the control system in operation around late February 1977 in order to evaluate the effectiveness of the unit. Observations made during this visit indicated discrepancies between actual operating conditions and design operating parameters. The contractor reevaluated the system design, discerning that the existing cleaning mechanism was inadequate.

The IEPA was once again forced to deny the facility general operating permit for the woodworking processes in June of 1978 due to the company's failure to meet the construction permit condition (no stack test data provided for boiler). Corrective action is being taken to meet the standards by early 1980.

3.10.1.7 Emission Profile

As shown in Figure 3-20, the boiler emissions were in excess of allowable emission levels for all years excluding 1972. In that year the electrostatic precipitator unit was said to be operational and effective (i.e., 98 percent efficient). It was reportedly removed from service after repeatedly malfunctioning. The boiler was, therefore, out of compliance during part of this period also. No definite dates were recorded regarding this unit. The second control device was short-lived. No real idea of its lifetime was given.

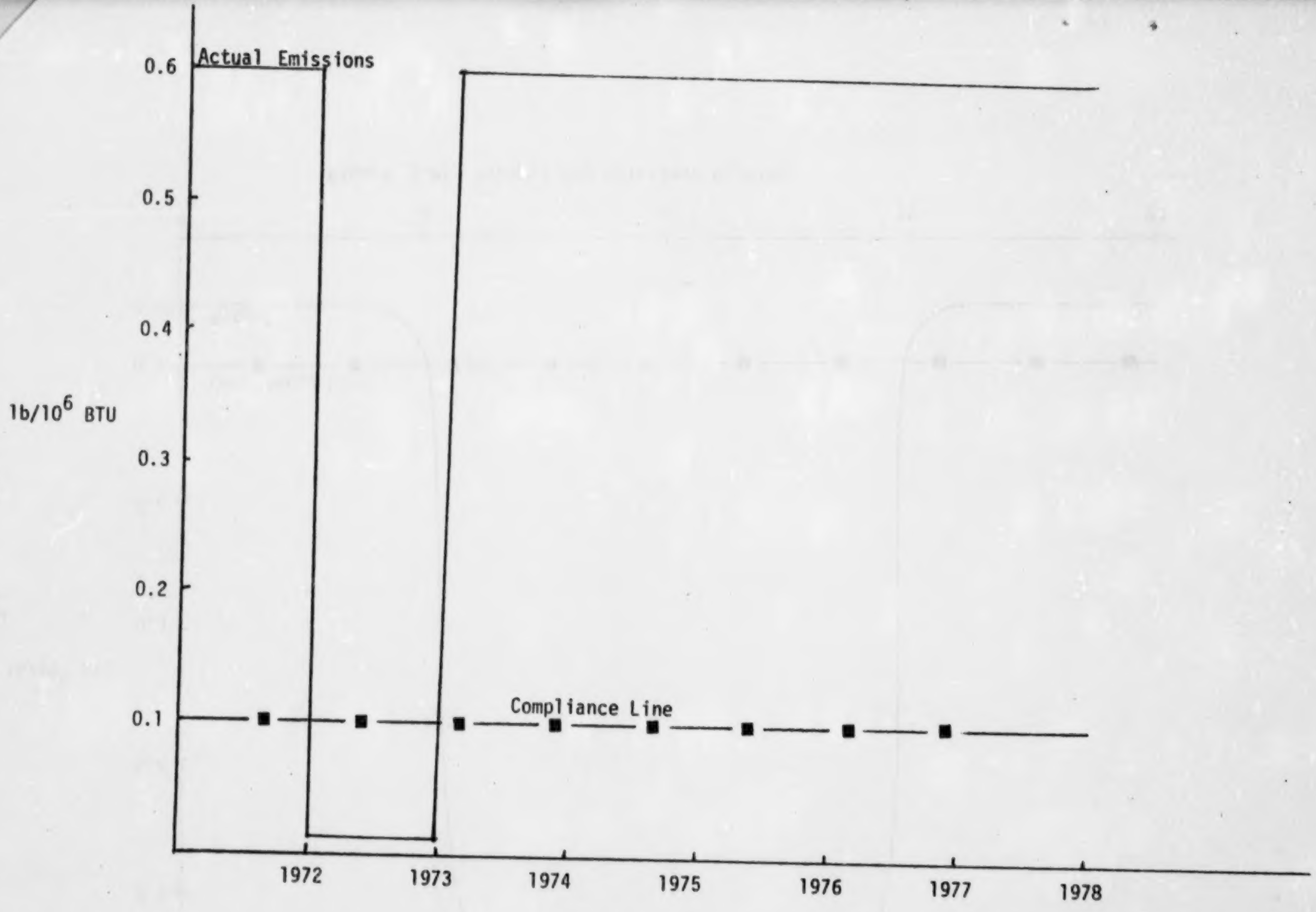


Figure 3-20. ANNUAL PARTICULATE EMISSIONS PROFILE

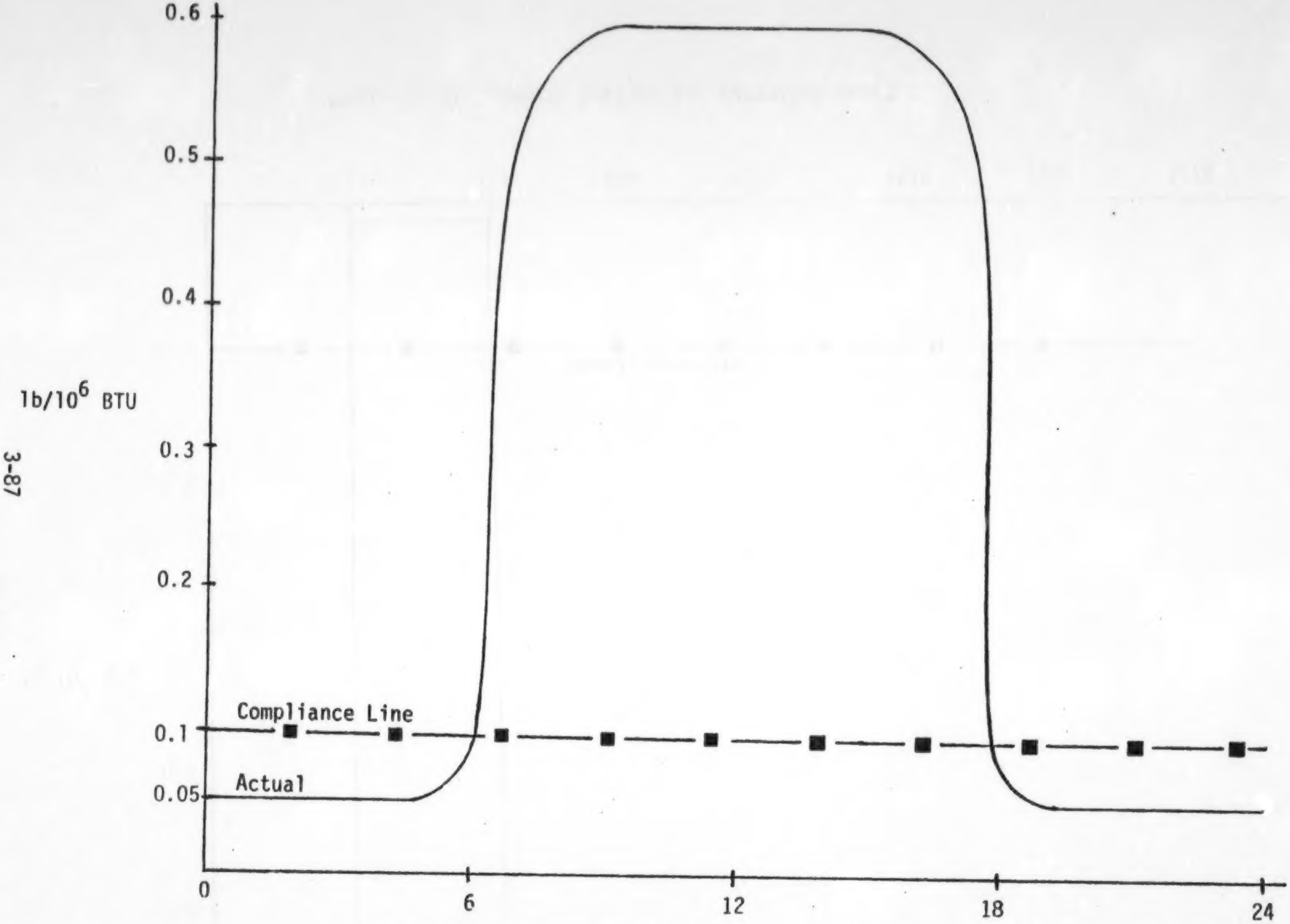


Figure 3-21 Typical Day Emissions Profile

3.10.1.8 Conclusions

The facility has been operating in violation of regulations of the IEPA and CDEC for the great majority of the years under consideration in this study. Although efforts to achieve compliance have been made, no longlasting solutions have been effectuated. Judging from data collected, it is felt that the source is not considered to be a major problem by either state or local agency. This is indicated by the IEPA's lack of involvement (i.e., enforcement actions) and CDEC's relatively passive approach.

3.10.2 FACILITY NO: 2

3.10.2.1 Facility Description

This facility is a mid-sized wallpaneling (wallboard) manufacturer. The plant occupies 2.6 acres and employs 100 personnel. The normal operating schedule for the plant is 24 hrs/day, five days/week and 49 weeks/year. The facility processes 18,700 lb/hr of hardboard per day. This hardboard is sold as decorative paneling to local concerns. The facility has been in operation since the mid-1950s. The major polluant emitted from the plant is hydrocarbons.

3.10.2.2 Key Operations and Pollution Control Equipment

Hydrocarbon emissions are associated with the coating/printing operation. In this process hardboard is printed with various types of designs/patterns. Large quantities of solvents used as vehicles for the paint pigment are required in this process. These solvent vapors constitute the only pollution problem created by this facility.

The majority of solvent is vaporized at one of the following six locations: the Precision Coater, Curtain Coater, Air Dry Hood, Olympic Dryer Oven, Coat Dryer Room, and Hot Air Oven. The IEPA and CDEC have designated these six locations as point sources. However, since the nature of the coating process does not lend itslef easily to mass balance of air contaminants on a point source basis, both agencies have combined all the point sources and regulate total plant emissions (i.e., total mass balance). This is done mainly as an enforcement tool.

Currently, the plant utilizes 200 gallons of solvent and 1,200 gallons of coating per day. The total amount of solvent volatized (evaporated), assuming all solvent used is volatized. is 664 gallons of solvent per day (approximately 4,382 pounds/day). This solvent usage has been steadily decreasing over the last eight years (approximately ten percent from 1970).

3.10.2.3 Financial Impact

Two financial factors relate to this source's effort to achieve compliance with the state's hydrocarbon regulations. The facility decided to switch their solvents and coatings to exempt solvents as defined by Rule 66. No financial data was available with respect to the development costs for the new coatings. However, the switch in coatings has resulted in a yearly increase in solvent cost of $150,000 ($178,700). In addition to this product cost, a new $65,000 ($77,400) paint bake oven had to be installed due to the nature of the exempt solvents. The State of Illinois Pollution Control Board also required a $10,000 ($11,900) performance board when the facility requested a time extension (variance) for converting to the exempt solvents/coatings.

3.10.2.4 Decision Making

Photochemically reactive solvents, as defined by Illinois regulation (similar to California Rule 66), were utilized by the facility until January 1976. A complete conversion to non-photochemically reactive solvents was made during late 1975 in response to a consent agreement with the U.S. EPA Region V Enforcement Division. No add-on control equipment has been installed at this facility since the transfer to non-photochemically reactive solvents has satisfied the conditions/limitations of the Illinois Hydrocarbon Regulation (Rule 205 (f)). However, a new paint bake oven had to be installed due to the use of the exempt paint solvents.

The facility is visited yearly by the CDEC. A physical inspection of all fuel burning equipment is carried out at this time. All process changes are noted by the inspectors with regard to solvent usage and products throughput. The CDEC inspectors do not, however, inspect the process equipment and do not require direct emission information such as stack sampling. No formal enforcement action was taken with respect to this facility prior to the 1975 U.S. EPA action.

The IEPA has inspected the facility once since 1972. This inspection consisted of a complete tour of the facility including all process and combustion equipment. No enforcement action resulted from this inspection.

3.10.2.5 Performance and Problems

Since the switch to exempt solvents was made in January 1976, no performance problems have been encountered. However, numerous problems appeared during the experimental stages of implementing the new solvents. This period extended from early 1975 through mid-1976.

The facility expressed two major concerns during the interview. The first involved the method by which the U.S. EPA released compliance information to the local media. The source contended they were initially informed of the Notice of Violation (NOV) by viewing a local television newscast. The second issue raised concerns the apparent lack of communication between each regulatory agency. The plant manager stated that their office's largest paperwork file concerned environmental affairs and that the majority of agency forms were duplications of previous efforts.

3.10.2.6 Emission Profile

As depicted in Figure 3-22, prior to 1976, the source was operating in excess of allowable hydrocarbon emissions. When the facility switched to non-photochemical (exempt) solvents and coatings in 1976, because of their nonreactive nature, compliance was achieved.

3.10.2.7 Conclusions

By switching to exempt solvents/coatings, the facility eliminated the possibility of installing a control device. Although CDEC conducts annual inspections, it was U.S. EPA and, to some extent, IEPA who were the primary instigators to convert to non-photochemcial solvents.

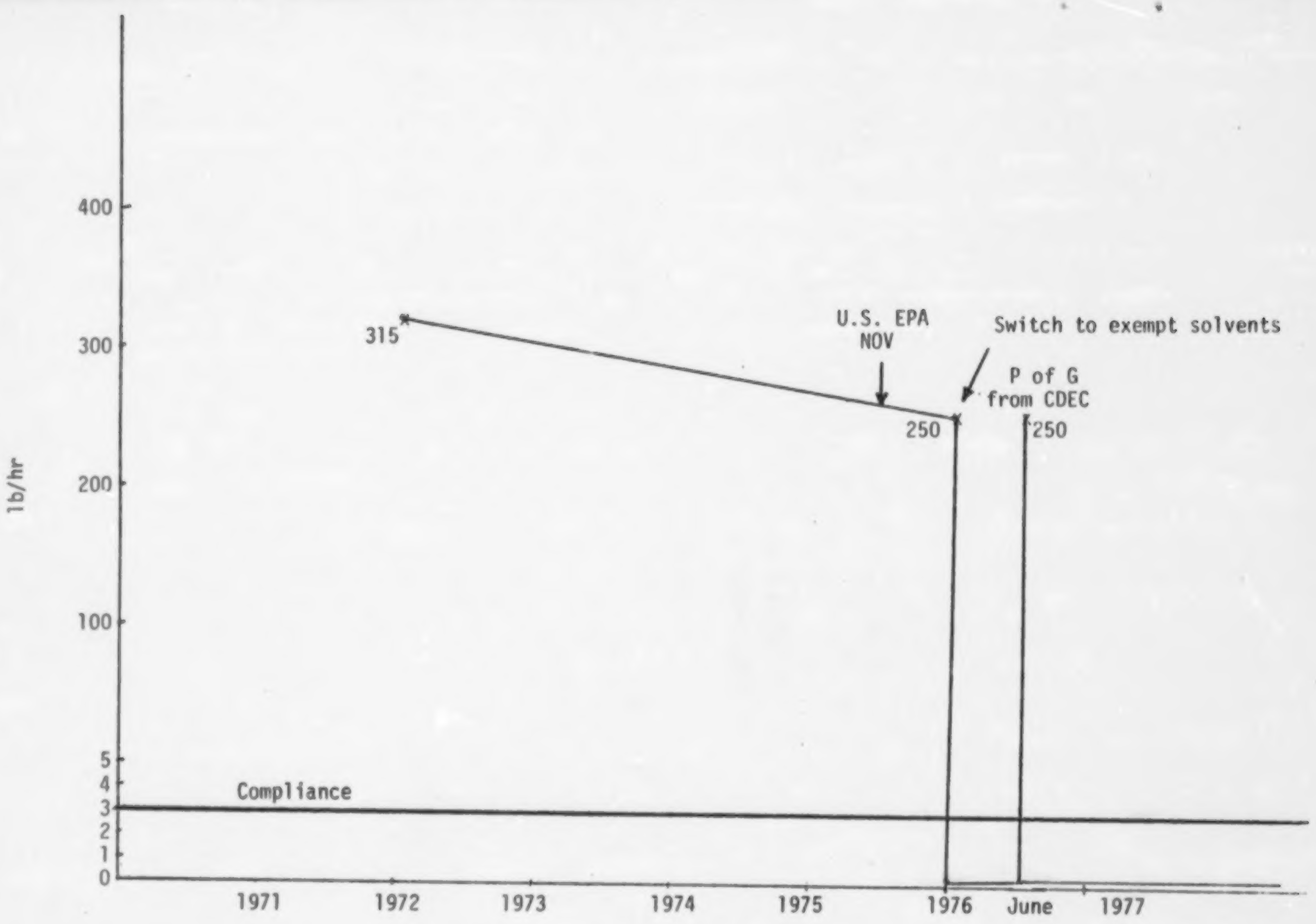


Figure 3-22 ANNUAL HYDROCARBON EMISSIONS

SECTION 3.11
FOOD PRODUCTS

3.11 SOURCE CATEGORY: FOOD PRODUCTS

3.11.1 SOURCE NO: 1

3.11.1.1 Facility Description

The source complex involving several food processing operations has as its major marketable product confectionaries. The site has been in operation for over 50 years, and presently utilizes 2,000,000 square feet in its production operations. The normal operating schedule is 16 to 18 hours per day, seven days per week with two seasonal peaks prior to Christmas and Easter. During the seasonal peaks, occurring in late fall and early spring, the operating schedule increases to 18-20 hours per day. The source currently employs 4,100 people.

3.11.1.2 Key Operations and Pollution Control

The processes of the source include the roasting of both peanuts and cocoa beans necessitating the use and maintenance of six peanut and two cocoa bean roasters. Since these roasters are gas fired, they do not require control equipment for combustion gases. There are, however, American Air Filter Rotoclones located in the cooling cars at the discharges of the roasters which are operating under permit of both IEPA and CDEC. These wet collectors, which are cleaned daily, are used to collect the hulls of the peanuts/beans being roasted to prevent potential fires in other process equipment.

Another phase of the manufacturing operation involves ten gas-fired rotary dryers which also do not require the use of control equipment for combustion gases. The source, on its own initiative, installed baghouses on the rotary dryers in order to recover the starch used to solidify the product. Cyclones were originally installed in the mid-1940's to recapture lost starch that was previously emitted and was causing a nuisance situation in the surrounding area.

In 1950, in an effort to increase the recovering efficiency of the starch for economic reasons, five Day Company baghouses were purchased and installed. Subsequent to that installation, six Micro Pulsair reverse jet baghouses were installed to further improve starch recovery.

3.11.1.3 Financial Impact

The cost of both the cyclones and Day Company baghouses were not ascertainable due to the length of time since their purchase and installation. The approximate cost of the Micro Pulsair baghouses was $25,000 ($45,625) per unit (including installation) and from $50-60 ($91-110) for each bag replacement usually resulting in an overall expense of $1,000 - 1,500 ($1,825 - $2,738) per unit twice a year, depending on the number of bags per unit.

3.11.1.4 Decision Making

The corporate headquarters in New York is the loci of the decision-making process. The installation of control devices were based on economic and equipment safety factors and the associated cleanup of air polluants was simply a beneficial side effect.

The source did not voluntarily seek state permits for these operations but simply responded to notices from IEPA that permits were required. The necessary IEPA permits were issued in 1972 and 1974.

3.11.1.5 Performance and Problems

As a result of the installation and operation at the baghouses, the source has realized a starch recovery rate in excess of 99 percent compared to the previous recovery rate of 50 - 60 percent from the three cyclones. In addition, the baghouses have eliminated the need for product replacement costs. Since these pieces of equipment were installed on the company's initiative and are operated according to the manufacturer's specifications, there have been no regulatory agency dealings other than annual permitting and regulation interpretations.

Overall, the source has had relatively few problems with the baghouses. All that is needed in the form of maintenance is a semiannual bag changing for each unit. The moisture content of the starch being collected is checked during each shift. Since the moisture content of the starch being collected during normal operations ranges from six to eight percent, an increase of the moisture content to approxiamtely seven to ten percent indicates that a bag change is needed. This indicator coupled with the economic factors of starch recovery insure proper operation of the baghouse.

3.11.1.6 Emission Profile

The control devices on the roasters and starching operations which were installed in the 1940s and 1950s satisfied all environmental regulations. Additionally, various economic and safety fators have insured proper maintenace and continued compliance.

3.11.1.7 Conclusions

This source, while it was never in violation of the applicable emission limitations, was not in compliance with the administrative requirements of IEPA. Only in response to notices from IEPA were permits applied for and subsequently granted. Indeed the source would do only the minimum. The 1972 IEPA actions did not include a complete list of all the emission points. Consequently, IEPA had to repeat the entire process again in 1974.

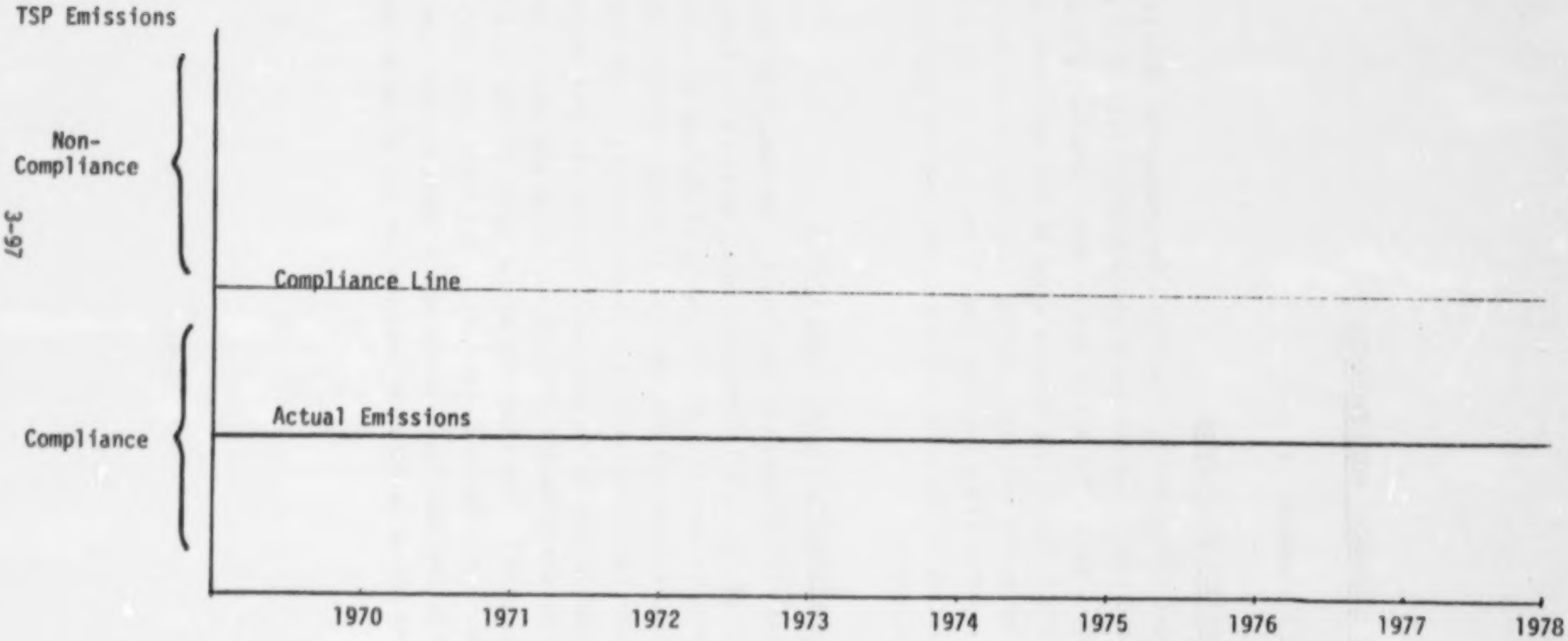


Figure 3-23 ANNUAL TSP EMISSION PROFILE

3.11 SOURCE CATEGORY: FOOD PRODUCTS

3.11.2 FACILITY NUMBER: 2

3.11.2.1 Facility Description

This industrial boilerhouse services the production facilities of a candy manufacturer. The average steam production rate of 50 percent of design capacity for any of the boilers. Seasonal production peaks and climatic conditions require usage of the coal-fired units in addition to the newest oil unit. During July, August, and September the large oil unit carries the load alone. The facility for which steam is generated is about two million square feet and employs over four thousand people.

3.11.2.2 Key Operations and Pollution Control

The original boilerhouse has four units. The newest boiler, an 80,000 lb/hour gal/No. 6 oil fired Zurn unit, received its IEPA construction permit in late 1976 and its permit to operate on June 29, 1977. The unit replaced the original (1925) 10,000 lb/hour coal-fired unit. Two other coal-fired units are in the facility. A 40,000 lb/hour and a 6,000 lb/hour units were built in 1939 and 1948 respectively. These units are presently on stand-by status and haven't been fired since July 1977. The remaining boiler built in 1962 is a 80,000 lb/hour gas/No. 6 oil Foster-Wheeler unit. All fuels (both coal and oil) utilized by the facility have had sulfur contents less than one percent. There are no particulate controls for any of the boilers.

3.11.2.3 Decision Making

Although the facility is a division of a national organization, there is autonomy from the parent corporation in the operations of the division. The decision to install the Foster-Wheeler oil-fired unit was based on increasing production and improving the efficiency of steam generation. The source's original plans to replace the coal-fired units entailed the purchase of steam from a nearby municipal incinerator (constructed in early 1970's). However, this source would not provide a reliable source of steam and the coal-fired units would have to be maintained at 100 percent stand-by availability. This would necessitate installation of particulate controls on these boilers. Although this was known in early 1974, the decision to install the Zurn boilers was not known to IEPA until late 1975.

3.11.2.4 Financial Impacts

In 1974, the estimated cost to install particulate controls was $350,000 ($460,500) to $450,000 ($592,100). Additionally the units have limited useful life remaining having been built in 1939 and 1948. Lastly there was some question as to whether these two units could provide the total steam load needed if the Foster-Wheeler unit were down. The new Zurn unit cost $630,000 ($829,000) installed.

3.11.2.5 Performance and Problems

The source had chosen to comply through shut down of the coal units and installation of a new oil-fired unit. No problems have occurred with the new unit for particulates and compliance with the sulfur dioxide regulations has continued through the use of low sulfur fuels.

3.11.6 Chronology of Permits and Exceedances

12/72 to 1/74	IEPA investigations/reports on Particulate violations and no operating permits
2/74 to 3/74	Warning letter on violations and source reply
10/74	IEPA Notice of Violation
6/75	Source petition for variance
6/75 to 8/75	Information requests/variance petition modifications/several legal filings
9/75	Variance Denied
10/75	Application filed for Foster-Wheeler operating permit
11/75	Permit to operate Foster-Wheeler boiler
9/76	Application filed for Zurn construction permit
6/77	Permit to operate Zurn boiler

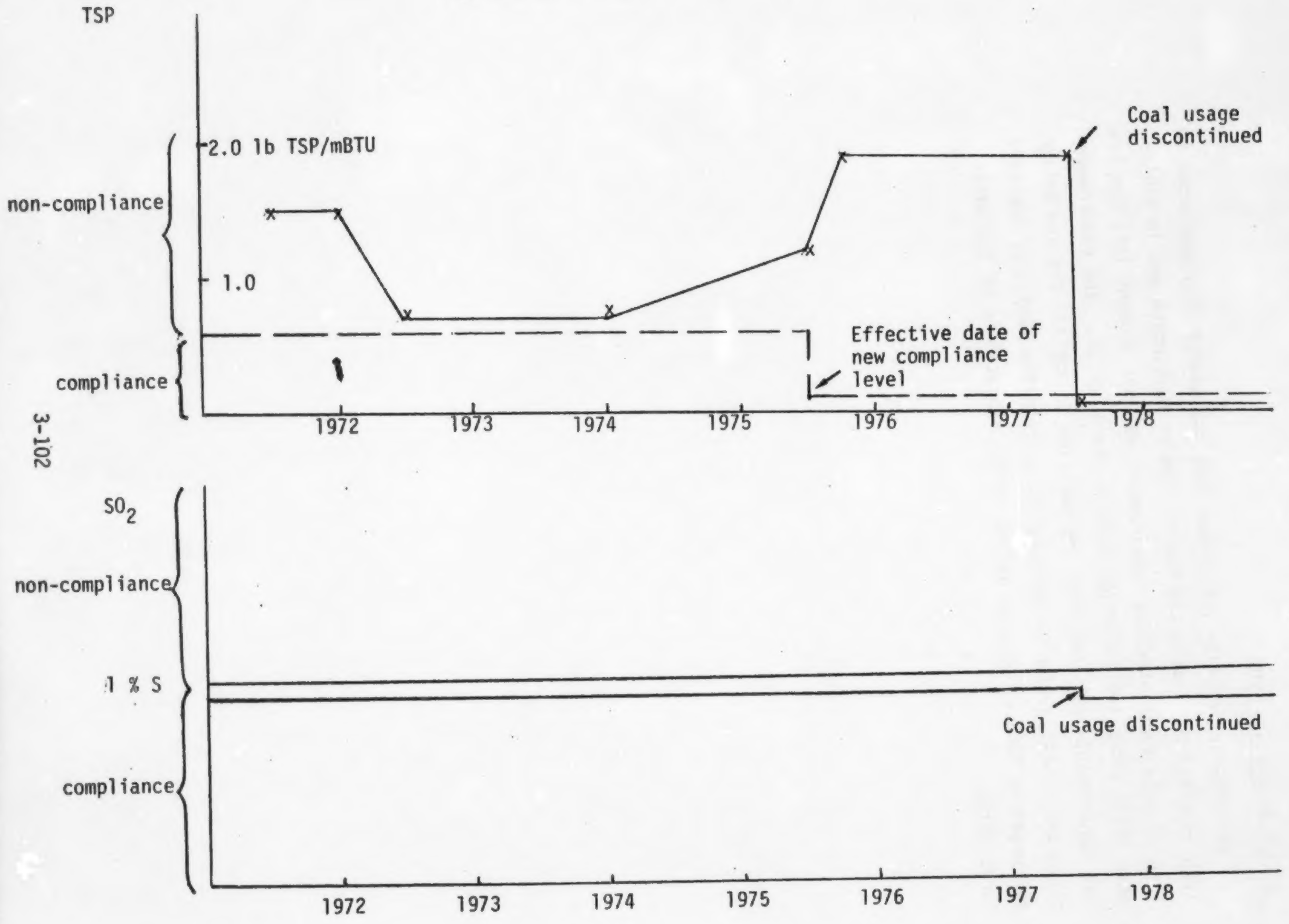
3.11.2.7 Emission Profiles

The source utilized low sulfur fuels prior to 1970 in compliance with CDEC rules. The source did not achieve compliance with particulate regulations until it finished burning its coal stockpile in July 1977.

3.11.2.8 Conclusions

The interaction with IEPA shows that the source only responded to IEPA initiative. Indeed the Foster-Wheeler unit which was in violation of only administrative requirements was not brought into compliance until after the Pollution Control Board denial. The environmental requirements only hastened the decision to install the new boiler since the investigation to purchase steam from the municipal incinerator began in 1968 as an alternative to the replacement of the coal-fired units.

Figure 3-24 ANNUAL EMISSION PROFILE



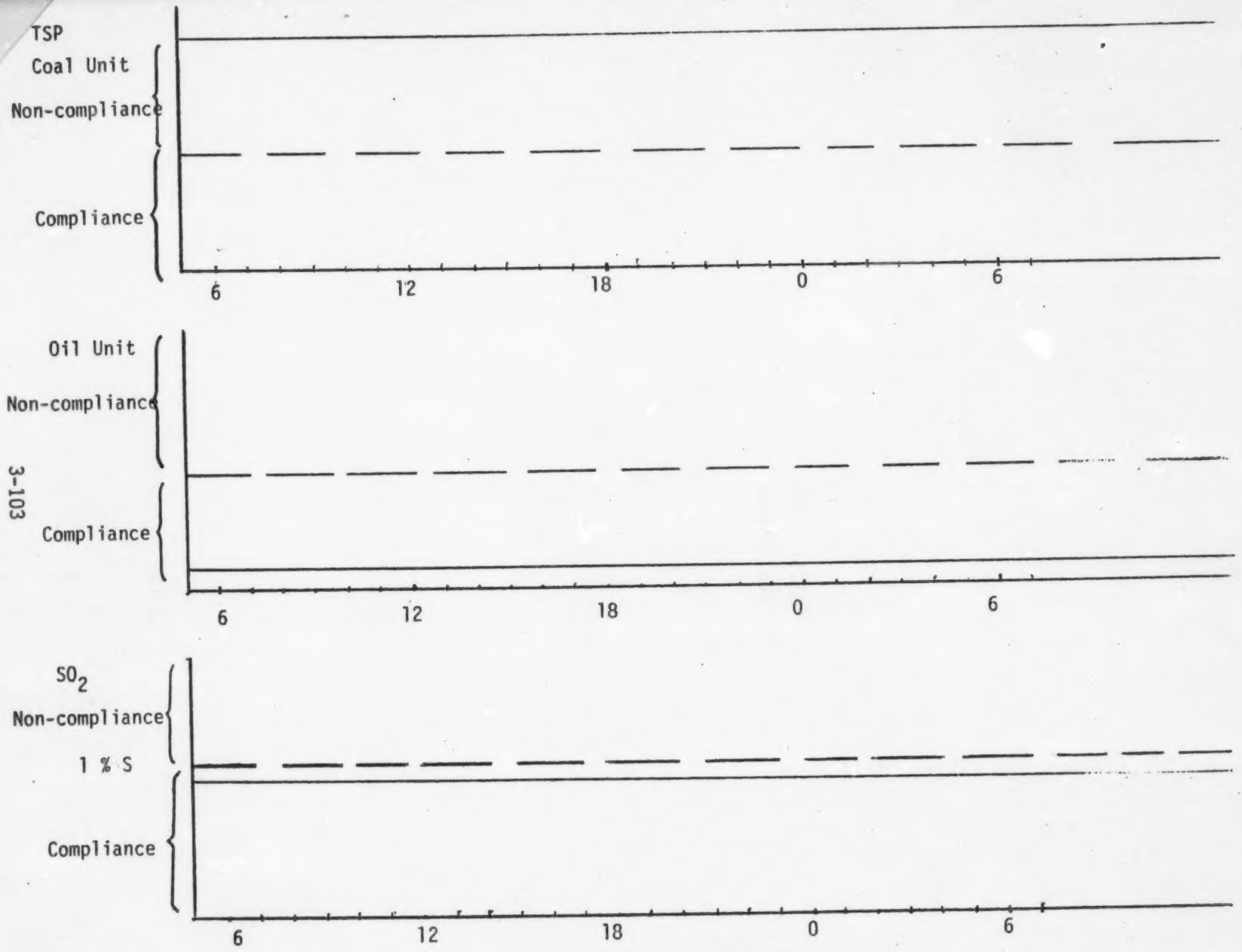


Figure 3-25 TYPICAL DAY EMISSIONS PROFILE

SECTION 3.12
SURFACE COATING

3.12 SOURCE CATEGORY: SURFACE COATING

3.12.1 FACILITY NUMBER: 1

3.12.1.1 Facility Description

This facility manufacturers diverse types of metal cans and miscellaneous can parts based on the highly varied specifications of consumers. Basic materials used are tin plated steel and at least 14 different coating materials. Production rates are highly variable (40-250 can/minute) depending on can types being run. Major processes are can fabricating and sheet coating/lithography. Sheets of tin plated steel are subjected to one or more coats and then cured in an oven. Printing or lithography is then applied and a varnish final coat is applied over the decorative exterior. Another oven curing is subsequently done, and the sheets are then cut, shaped, and seamed to produce the final product. Natural gas is used for baking/curing and ancillary processes. Steam for space and not water heating is purchased from a nearby facility. Total plant employment is about 190 people working on a six day schedule.

3.12.1.2 Key Operations and Pollution Control Equipment

Fugitive emissions from two of the three coating lines are collected by a hood device which exhausts to a catalytic afterburner. The third line uses exempt solvents. Approximately 15 to 25 percent of the total VOC used is emitted in the coating application area. The remainder is drawn off in the ovens during baking/curing. The resultant exhaust from the ovens is mingled with the VOC collected by the hood system and processed through the catalytic afterburner.

3.12.1.3 Decision Making Process

The spokesman for this source stated that the state was the main incentive for installation of the afterburner control system. This is especially interesting in light of the fact that this corporate spokesman stated that he was speaking also for the entire can industry in his capacity as spokesman for the Can Manufacturing Association. Additionally, this individual has been associated with industry/regulatory affairs and was involved in development of a Reasonable Available Control Technology (RACT) and the model regulations for this industry.

At this particular facility precontrolled VOC emissions exceeded allowable limits and therefore required emission limitation devices. Two alternatives were recognized; either solvent reformulation (low or exempt solvent coatings); or an afterburner. The catalytic afterburner was selected because the solvent reformulation approach was felt to be time consuming, in need of "massive" research efforts, and a relatively long term solution. It should be remembered that their final choice was to have two of the three lines utilize the afterburner, while the remaining line used solvent reformulation for control. Though not specified, a reasonable assumption could not be made that this was for comparison purposes.

It was the contention of this spokesman that the midwestern states were reasonable regarding regulations and working relationships, but that a preponderance of red tape was involved in the elaborate administrative and permit procedures. Additionally, the source felt that the state regulations (which classified methane as a reactive pollutant requiring control) were in error and should be changed.

In the opinion of the facility, the can industry, perhaps was the first to present U.S. EPA with an economic analysis/impact of the regulations.

3.12.1.4 Financial Impact

The hooding system to capture fugitive emissions from coating application was installed at a cost of $3,000 ($3,947). The afterburner, which uses natural gas as a supplementary fuel, was installed in 1975 at a cost of $250,000 ($298,000). The initial annual operating cost was approximately $89,344 but due to the rise in natural gas costs in the past four years, the facility has experienced an increase in the operating cost to $95,300 per year. Further, similar hike in gas costs is anticipated in the next four years. Other associated costs are catalyst regeneration (performed every three years on plant premises) and stack testing. Coating reformulation costs were not determined but the industry spokesman stated they would be higher than the existing coating costs.

3.12.1.5 Performance and Problems With Control Equipment

The catalytic afterburner operates in the temperature range of 700-900^{0}F. This device processes approximately 4,000-5,000 SCFM of VOC-laden gases, with a reduction efficiency of 90 percent (excluding methane and carbon monoxide). The facility does not maintain any records or perform any stack tests on a routine basis because of prohibitive stack test sampling costs (about $2,500 per test). The plant was on a learning curve with respect to operation/maintenance of the afterburner and to debugging some of the problems that have developed in the initial stages of its operation. Other than these start up difficulties no major problems were encountered by the facility.

3.12.1.6 Chronology of Events

In April 1974, the IEPA and CDEC notified the facility that it was required to control its VOC emissions. Reformulation of some of their coatings and installation of an afterburner were scheduled to be completed by mid 1975. This time schedule was extended to the end of 1975 because of the complexity of coating reformulation and the delay in the issuance of a state construction permit for the afterburner. Several requests were made by the facility for periods of grace (P of G) from the CDEC in hearings before their Appeal Board. The P of G's were granted until the facility came into compliance. Subsequent to the installation of the afterburner, a stack test was conducted in the presence of CDEC personnel in November 1975. The facility submitted these stack test results in April 1976 to both regulatory agencies. After this submittal both agencies listed the source to be in compliance.

3.12.1.7 Emissions Profile

The source listed the process as confidential, and since no emission data could be released from the IEPA files as they had to get a release from the source, a qualitative profile rather than a quantitative one is presented in Figure 3-26.

3.12.1.8 Conclusions

There seems to be some misinterpretation of regulations as to the inclusion of methane as a pollutant. After the installation of the catalytic afterburner in 1976, the facility is found to be in compliance. Until then it was operating in violation of the hydrocarbon emission standards. The pressure exerted by the IEPA and CDEC were the primary factors responsible for the source's effort to reduce its emissions.

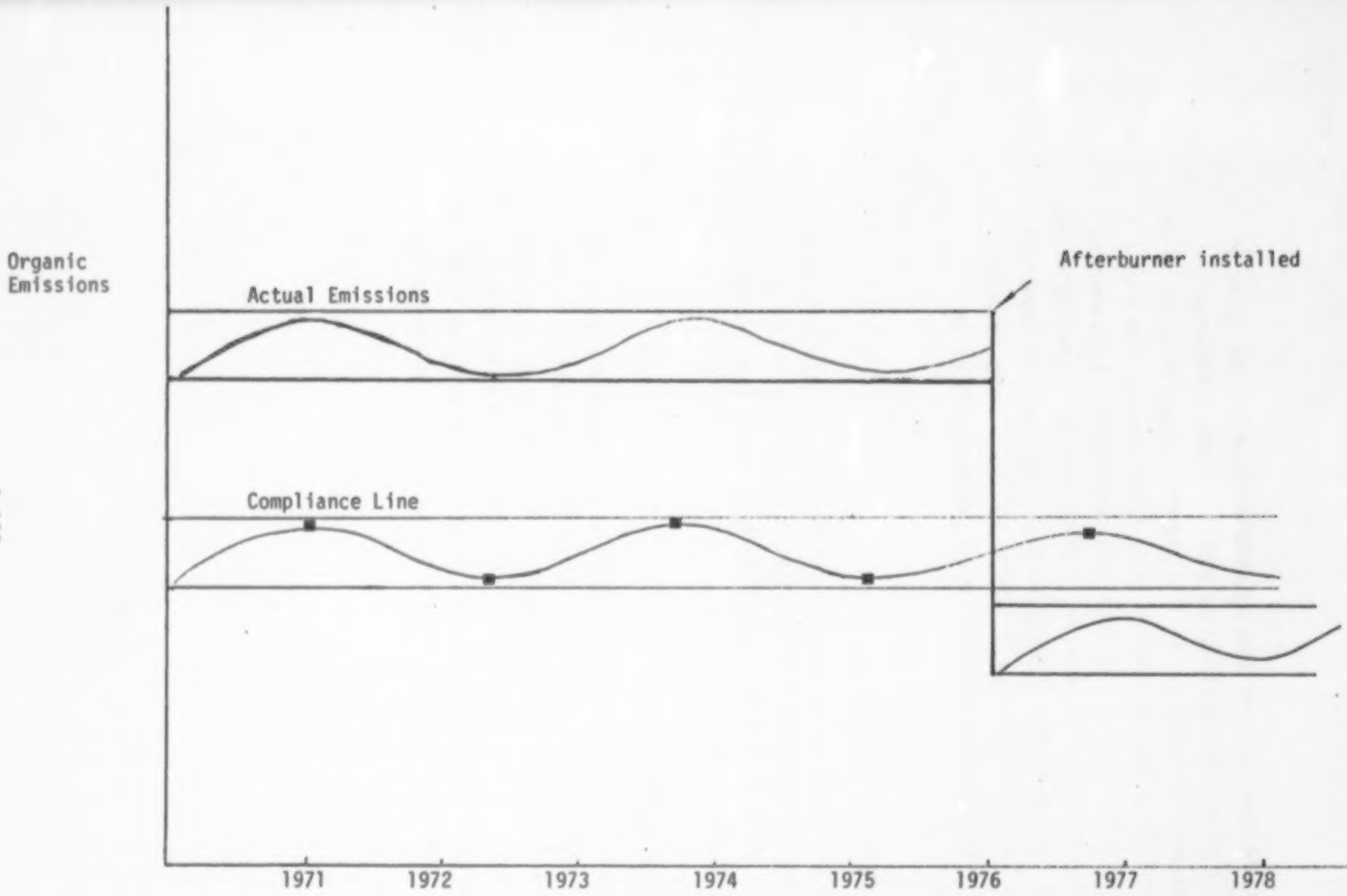


Figure 3-26 QUALITATIVE PROFILE OF HYDROCARBON EMISSIONS

(actual emissions vary over a band, depending on the production rate)

3.12.1 FACILITY NO. 2

3.12.2.1 Facility Description

The source assembles pre-fabricated parts in a light-duty vehicle. The major operation of concern with respect to VOC emissions is the painting operations which include spray painting, flow coating, and its associated drying and curing ovens. The source is situated on an 86 acre site of which 69 acres are utilized for the plant's production operations. The operating schedule is 16 hours a day, five to six days a week (depending on sales demand) for 50 weeks a year. The work force is over 4,000 persons.

3.12.2.2 Key Operations and Pollution Control Equipment

The facility has 11 flow coater or paint spray booths and 13 ovens which are the potential sources of HC emissions. The only control device presently in operation is a scrubber on a small parts flow coating operation.

3.12.2.3 Decision Making

This facility is a major plant within a dvision of a nationwide organization. Initial decision making begins at the facility. However, there is substantial interaction with the parent company's environmental staff. A "decision-making package" with respect to pollution control equipment is prepared and presented to the division and then the parent company. Final authorization is made by the parent organization. Also formal interaction with the regulatory agency is through the parent corportation's environmental group.

3.12.2.4 Financial Impact

The source reduced the HC emissions by reformulation of its paints. The changeover to Rule 66 exempt solvents occurred during 1973 is on a color by color basis. No financial information is available on the incremental cost of the reformulated paints. A small parts flow coater could not utlize exempt solvents. Consequently, a scrubber was installed on this source in 1974 at a cost of $350,000 ($461,000).

3.12.2.5 Performance and Problems

The change to exempt solvents in the paint formulations did not result in any production problems. The scrubber, operating as planned, did not solve the odor problem.

3.12.2.6 Chronology of Permits and Exceedances

The source submitted their original permit applications in December 1972. These permits were denied in April 1973 for HC emissions and related odor problems. The small parts flow coater was specifically identified for the odor problem. The source entered into "Agreed Order" to switch to paints with exempt solvents and to install a scrubber on the small parts flow coater which could not be changed to an exempt solvents paint formula.

The paints were reformulated on a color-by-color basis during 1973. The scrubber was installed by September 1974. The operating permit for this flow coater was denied for failure to supply paint formulations and for odor problems. The paint formulas were supplied but the permit was again denied for odor problems. To the end of the study period there is correspondence relating to the lack of operating permits and the odor problem.

In January 1976 a construction permit was issued for a new bake oven which would be used to improve product quality but not result in increased emissions (eight potential or actual).

3.12.2.7 Emissions Profile

During 1973, the reformulation of the paints reduced the HC emissions from 1,200 lb/hour to 11 lb/hour. The scrubber on the small parts flow coater reduced the 11 lb/hour HC emissions to a few lbs/hour for the two shifts/day during which it has operated.

3.12.2.8 Conclusion

The source did respond to the original permitting process by entering into an "agreed order" to reformulate its paints and install a wet scrubber. The odor problem remains and is the basis for the difficulty in obtaining operating permits. The source is meeting the emission limits of the applicable regulations. Through the end of the study period, no affirmative plan of action is in evidence to resolve the problem.

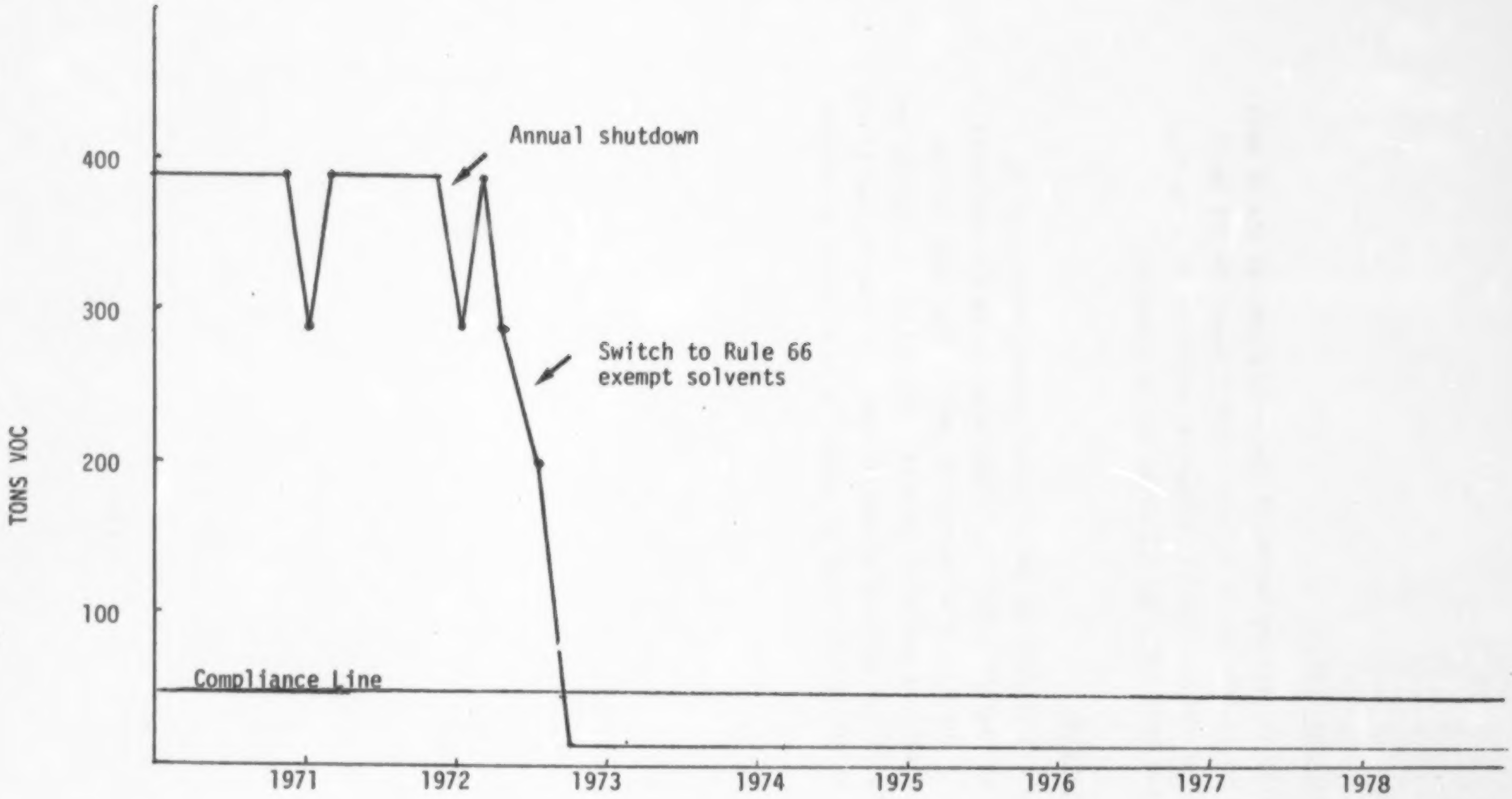


Figure 3-27 ANNUAL EMISSIONS PROFILE

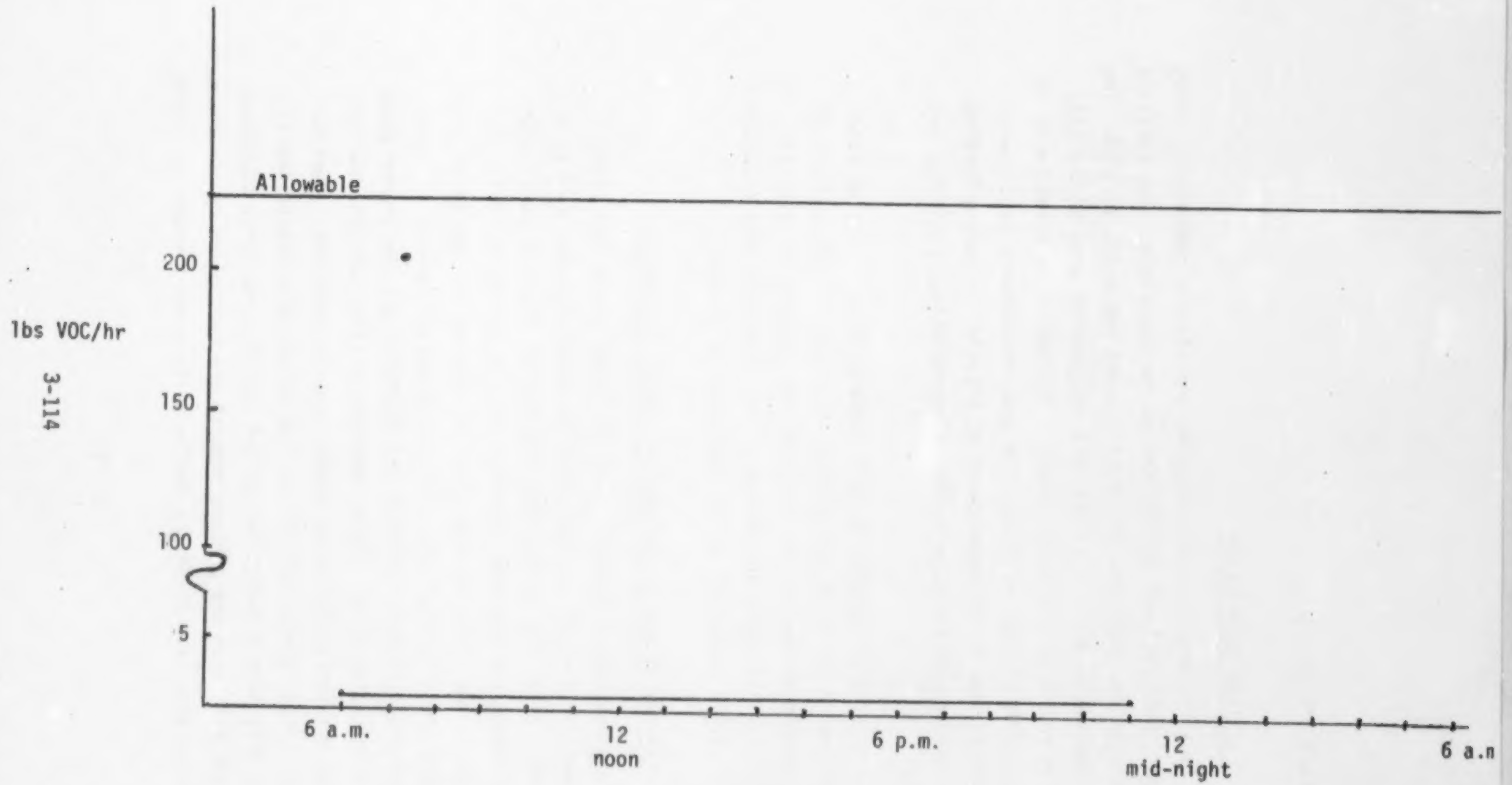


Figure 3-28 TYPICAL DAY PROFILE

3.12.3 FACILITY NO: 3

3.12.3.1 Facility Description

This facility manufacturers bicycles and bicycle components, using steel stock, paint/solvent and thinner as raw materials. The facility was started in the 1800s and the present plant was built in 1913. The plant is located on a 41 acre site in a residential area of the city and employs approximately 1,500 people. The operating schedule is 16 hours/day, 220 days/year with two five week maintenance shut downs. Typical operations in the manufacture of bicycles including forming, stamping, welding, brazing, grinding, electroplating, painting, and assembling.

Annual bicycle production in 1973 consumed 20,000 tons of steel, 41,000 gallons of paint, 6,300 gallons of primer, 37,000 gallons of paint and primer solvents. The bicycles are shipped all over the continental U.S. via rail and trucks. The production rate fluctuates between 300,000 - 1,500,000 units, depending on demand.

3.12.3.2 Key Operations and Pollution Control Equipment

The main sources of interest were the frame primer and paint lines. Paint preparation includes washing, phoshorizing, drying, and dip priming. After the appropriate preparation (through metal priming), the frames are processed through an aluminum spray booth, a drying tunnel, and a drying oven prior to passing through three color spray booths and a baking oven. The two potential sources of hydrocarbon emissions (organic solvents and thinners) are the primer paint line and color paint line. These, however, utilize non-reactive solvents which are formulated using exempt organic chemicals. Particulate matter (iron, steel, and silica from grinding/polishing operations) are effectively controlled by ten cyclones and three baghouses. Chronic acid mist from the plating process are controlled by scrubbers. Additionally, they have three dry baffle filters and a water wall spray

spray booth filter installed in the color paint area. The old had spray guns and have been replaced with electrostatic-disc guns which are believed to have reduced particulate emissions substantially. The facility is currently in the process of switching from electrostatic guns to the more efficient turbo disc systems, which further reduce emissions while conserving paint.

3.12.3.3 Financial Impact

Replacement costs of hand spray guns to electrostatic spray guns resulted in expenditure of $54,000 in capital investments. The new robotic touch-up system (for paint reinforcement), currently under consideration, will cost approximately $52,000 (excluding installation). The cost for baghouses, scrubbers, and cyclones is unknown but the maintenance costs (requiring the service of nearly 40 manhours/week) are on the order of $15,000 per year. The facility incurred some expenses in changing to exempt paint solvents. The facility also hired consultants to determine its compliance wth IEPA requirements, and for the development of data required to respond to a U.S. EPA Section 114 letter. The facility spokesman noted that all data compiled for this U.S. EPA report represent, at minimum, emmissions based on mass balance if not stack tests performed specifically in response to this request.

3.12.3.4 Decision Making

The vice-president of the facility is charged with the responsibility of decision-making with respect to control devices or paint reformulations. The decision to switch to exempt coatings and solvents was made when obtaining operating permits for the potential emission sources (applied in 12/72; granted in 1973). A world-wide shortage of exempt solvents prompted the facility to apply for a one year variance in 1974. However, only six months variance was conditionally granted. The facility agreed to look into different reformulations of coatings using more readily available exempt solvents. The facility felt that changes in basic painting methods to either water base paints or powder coatings would be damaging to their product and would require major modifications to their existing system. However, the facility presently employs 12 percent by weight solids in the coatings and intends to progress to intermediate (47 percent solids) coatings and, ultimately, to high solid formulations (80 percent).

The company representative explained to investigators that top management has dictated that a free, above-board policy be adopted and maintained regarding all potential emissions sources, thereby relaxing their relations with the regulatory agency. In fact, the gentleman which held the interview and plant visit explained that 50 percent of his job was to prepared and relay all data requested by the different agencies.

3.12.3.5 Performance and Problems

No problems were reported concerning performance of the control alternative implemented.

3.12.3.6 Chronology of Permits and Exceedances

The facility applied for operating permits for the potential emission source (priming and color painting) in December 1972. Upon switching to exempt solvents/coatings, the IEPA issued permits in 1973. However, in June 1974, the company petitioned for a variance so as to enable the use of non-exempt solvents for a period of one year due to a major shortage of solvents. The request was granted by order of the Board (IPCB) with exception. Only a six month variance was granted. The source's supply of exempt solvent was exhausted by April of 1974. For a six month period then, the company employed non-exempt solvents, thereby placing them out of compliance with IEPA regulations.

3.12.3.7 Emission Profile

The emission profile illustrates that the process has been in compliance since late 1974 without exception. A planned exceedance of the allowable emission level was experienced in 1974 when the facility was forced to switch to non-exempt solvents. It operated under the sanction of a six month variance and returned to exempt solvents when they became available. All hydrocarbon emissions are calculated based on a mass balance which assumes all solvents are emitted to the atmosphere. The paint lines have not undergone any major changes since 1975.

3.12.3.8 Conclusions

The facility was found to be unique from most sources visited due to the open book policy which is upheld by its management. All data regarding emission sources is willingly provided and all efforts are made to comply with regulations and wishes of the regulatory agencies. This attitude lends itself to excellent working relationships between the facility and responsible agencies.

The facility responded to regulations regarding hydrocarbons by switching to exempt solvents. Since they meet regulatory requirements in this fashion, no external control is required. The source representative indicated that they would, by necessity, consider the installation of integral oven-fume incinerators in the event that Chicago is declared non-attainment for photochemically reactive oxidants.

Permits are applied for on a continuing basis, no permits actually being required by the city. The spokesman stated that the CDEC was satisified if the State would issue permits. He also reported that if permits are kept current and submissions are timely with no changes, the State simply renews them without quetsion. If changes are made in permits to reflect process changes (i.e., change in paint consumption), they will do a routine check. IEPA inspectors generally visit the facility once a year. Chicago DEC personnel conduct thorough inspections of the facility twice a year. The representative noted that these inspectors are very thorough and generally cover every emission point (i.e., stack) within the facility. According to him, CDEC concerns itself more with the correspondence/inventory of stacks on the premises than process changes made on the floor.

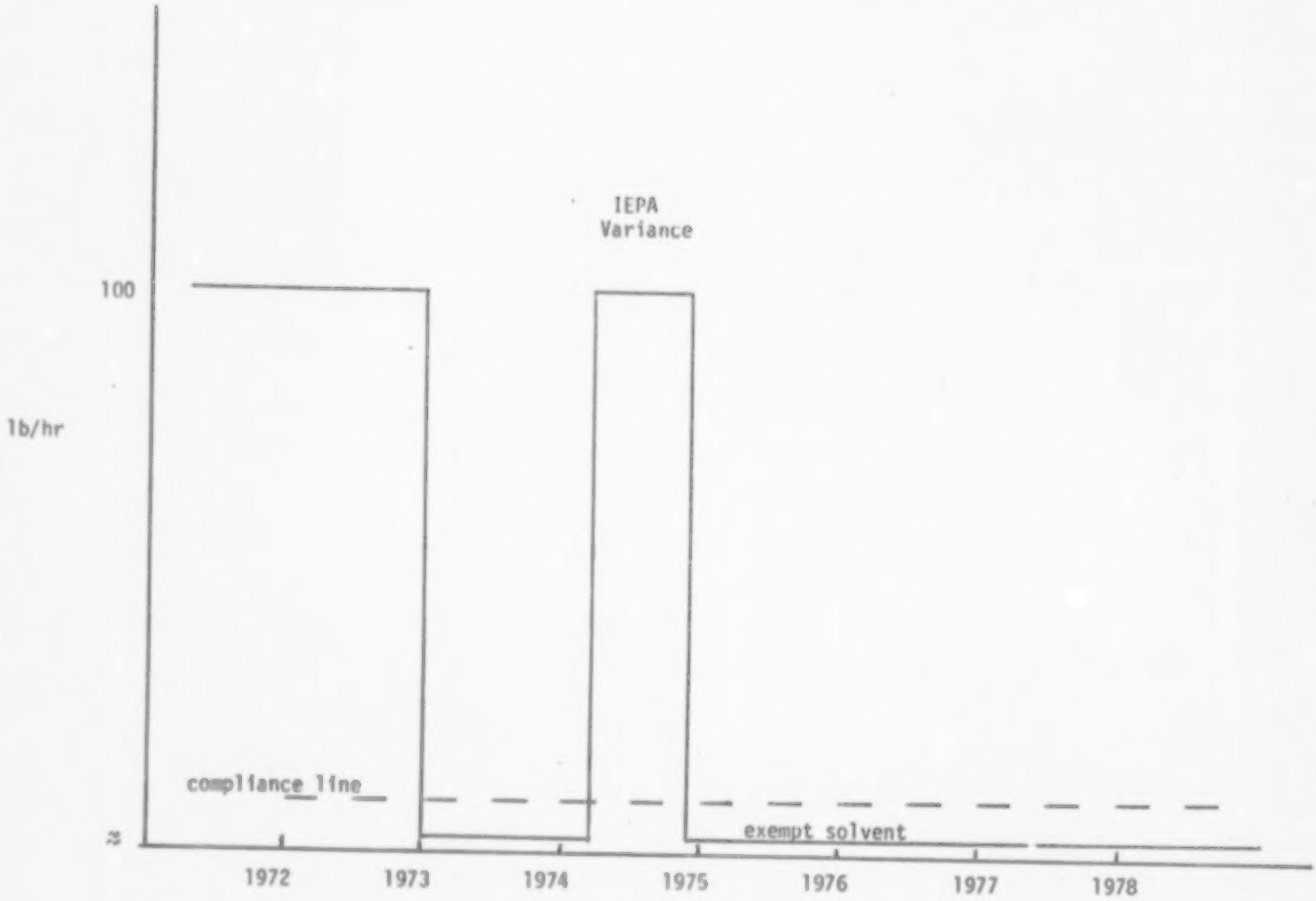


Figure 3-29 SURFACE COATING PROFILE